CHAPTER 5

The Environment: What's There Now, Project Effects, and Mitigation

This chapter presents an analysis of the potential effects of the Kirkland Nickel Project on people and the environment. Scientists and planners from the project team conducted more than 20 different studies and summarized their analysis in Discipline Reports to illustrate how the project might affect the area. They used this information as a baseline for examining changes that can occur as a result of constructing improvements to I-405.

The following discipline reports were prepared for the project. The complete discipline reports are found in Appendices F through Z on a CD included with this Environmental Assessment:

- Air Quality
- Cumulative Effects
- Economics
- Energy
- Environmental Justice
- Fish, Aquatic Habitat, and Threatened and Endangered Species
- Geology, Soils, and Groundwater
- Hazardous Materials and Wastes
- Historic, Cultural, and Archaeological Resources
- Land Use Patterns
- Land Use Plans and Policies
- Noise
- Public Services and Utilities
- Section 4(f) Evaluation
- Social Elements
- Surface Water and Floodplains

Entrance to Spinney Homestead Park

Landslide slope south of SR 522

What is a Discipline Report?

A discipline report focuses on an environmental topic (discipline) of concern, such as wildlife, noise, water quality, or other built or natural resources. It presents an analysis of the environment with respect to that discipline, how the project may affect that environment, and offers recommendations on how best to avoid or minimize adverse effects to that environment.

- Transportation
- Visual Quality
- Water Quality
- Wetlands
- Wildlife, Habitat, and Upland Threatened and Endangered Species

The study area for each discipline report varied, depending on the geographic extent of the potential effects being evaluated and the type of data needed for the analysis. For example, the analysis of recreational facilities required WSDOT to collect data on parks within one-quarter mile of the I-405 right of way. To assess effects on social characteristics, however, WSDOT used Census information and the Puget Sound Regional Council's Forecast Analysis Zone data because these data include a wider geographic area around I-405.

How was environmental information used to improve the project?

Once the project team collected the environmental baseline data, team members met with the roadway designers to identify places where project construction could have an effect on the environment. For example, to reduce effects to wetlands, WSDOT overlaid wetland locations on the preliminary design plans and made adjustments in the roadway alignment, roadside slopes, and location of stormwater facilities. They made several field visits to examine culvert crossings along the corridor and to propose ways of modifying the grading plan to avoid the need to extend culverts, and to minimize or avoid effects to streams. The project team also used information about a wellhead protection area in Kirkland to modify the location of stormwater discharge points to avoid potential effects on water quality. They made similar efforts to reduce or avoid effects to visual quality, vegetation, geological features, and noise.

What are potential effects?

Potential effects are impacts or changes that could occur as a result of a proposed action. The effects may be ecological, aesthetic, historic, cultural, economic, social, or health-related. Examples might include the encroachment upon nearby wildlife that occurs from widening a roadway; the improvement of fish passage from retrofitting a blocked culvert; or how increased noise levels from traffic flow might affect nearby residents.

How were potential effects evaluated?

After making modifications to minimize or avoid effects, WSDOT again compared the project design to the baseline conditions. This comparison enabled us to determine environmental, social, and economic changes that would

result from constructing and operating the Kirkland Nickel Project. For example, scientists evaluated what could happen to water quality both during and after construction. Economists examined the effects of property acquisitions on social and economic conditions. Other findings included:

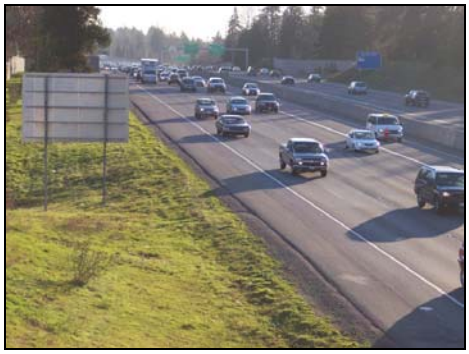
- Traffic will increase in the I-405 Corridor whether the project is constructed or not. The Kirkland Nickel Project will improve mobility and safety and provide additional capacity by adding general-purpose lanes as discussed in Chapter 4, Description of the Project.
- The estimated energy consumption with the operation of the Kirkland Nickel Project will make up a very small portion of the overall amount of fuel consumed annually by Washington State commuters.
- There are no farmlands affected by the project. Consequently, this topic was not addressed in this document.

Team members evaluated these and other aspects of the environment and documented these issues in separate discipline reports. The results of these analyses are summarized in this chapter.

For a cross reference of how discipline reports were grouped in this EA with respect to the NEPA Elements of the Environment, see Appendix C.

5.1 Traffic and Transportation

The I-405 Corridor serves as an important transportation thoroughfare for the region. Increased traffic is a result of growth of the regional economy and associated changes in employment and population. Understanding how existing traffic and transportation conditions will change over time is important to many people within the region. WSDOT has assessed the data for both the proposed project and the No Build Alternative to provide an accurate depiction of how traffic conditions along I-405 will look in the future.



Congestion on I-405

How were the data for the Kirkland Nickel Project evaluated?

A travel demand forecasting model, consistent with the Puget Sound Regional Council's forecasts, was used to provide information about future year volumes on I-405. WSDOT reviewed the results of these forecasts for consistency with the cities of Kirkland, Bellevue, and Bothell; King County Metro, Sound Transit, Snohomish County, Community Transit; and the Puget Sound Regional Council. A microsimulation model was subsequently used to analyze freeway operations.

Please refer to the Kirkland Nickel Project Transportation Discipline Report in Appendix F (on CD) for a complete discussion of the traffic analysis.

What is traffic like now along the freeway and what will happen in the future?

On a typical weekday, 191,000 vehicles currently travel along the I-405 Corridor in the Kirkland Nickel Project area. Some 99,000 of these vehicles travel southbound and 92,000 travel northbound. After the project is constructed, the traffic models predict that 211,000 vehicles will travel through the area in 2014 and 239,000 vehicles in 2030. If the project is not constructed, the flow of traffic will be constrained, which means that not all drivers wishing to travel on I-405 will be able to do so. If the project is not constructed, 11,000 fewer drivers will be able to use this part of I-405 in 2014; and 16,000 fewer in 2030.

During the peak period, I-405 in this section commonly experiences bumper-to-bumper and stop-and-go traffic, slower vehicle speeds, and more rear-end collisions. The

usual morning peak hour for I-405 traffic congestion lasts from 7 AM to 8 AM; in the evening the greatest congestion occurs from 4 PM to 5 PM. The times of highest traffic congestion are usually when people are traveling to and from work. As congestion has increased in the region, it has extended these peak periods to the point that congestion commonly lasts for several hours in both the morning and evening. Benefits of the Kirkland Nickel Project will be realized by increasing roadway capacity and reducing bottlenecks that contribute to congestion (Exhibit 5-1).

The following paragraphs give a snapshot of traffic conditions today and how they will look in the future on this part of I-405.

Southbound in the Morning

Today

The typical southbound morning peak hour has between 5,600 to 6,300 vehicles in the general-purpose lanes and another 700 to 1,000 vehicles in the HOV lane. General-purpose traffic is so congested that average speeds are only about 45 miles per hour with frequent stop-and-go conditions. Traffic in the HOV lane tends to move at the posted limit, 60 miles per hour. Exhibits 5-2 and 5-3 present a comparison between morning conditions for the Build and No Build general-purpose lane volumes and average speeds in general-purpose and HOV lanes.

No Build Alternative in 2014

If we build nothing, during the peak hour there will be between 5,100 and 6,400 vehicles in the general-purpose lanes and 210 to 520 vehicles in the HOV lane. The decrease in the number of vehicles in the HOV lane is attributed to a traffic model assumption that HOV lane eligibility will change from two-persons-per-vehicle (2+) to three-persons-per-vehicle (3+) by 2014. The average speed in the general-purpose lanes will drop to about 35 miles per hour, with frequent stop-and-go conditions. The average HOV speed will remain at about 60 miles per hour.

Exhibit 5-1
Traffic Conditions Today

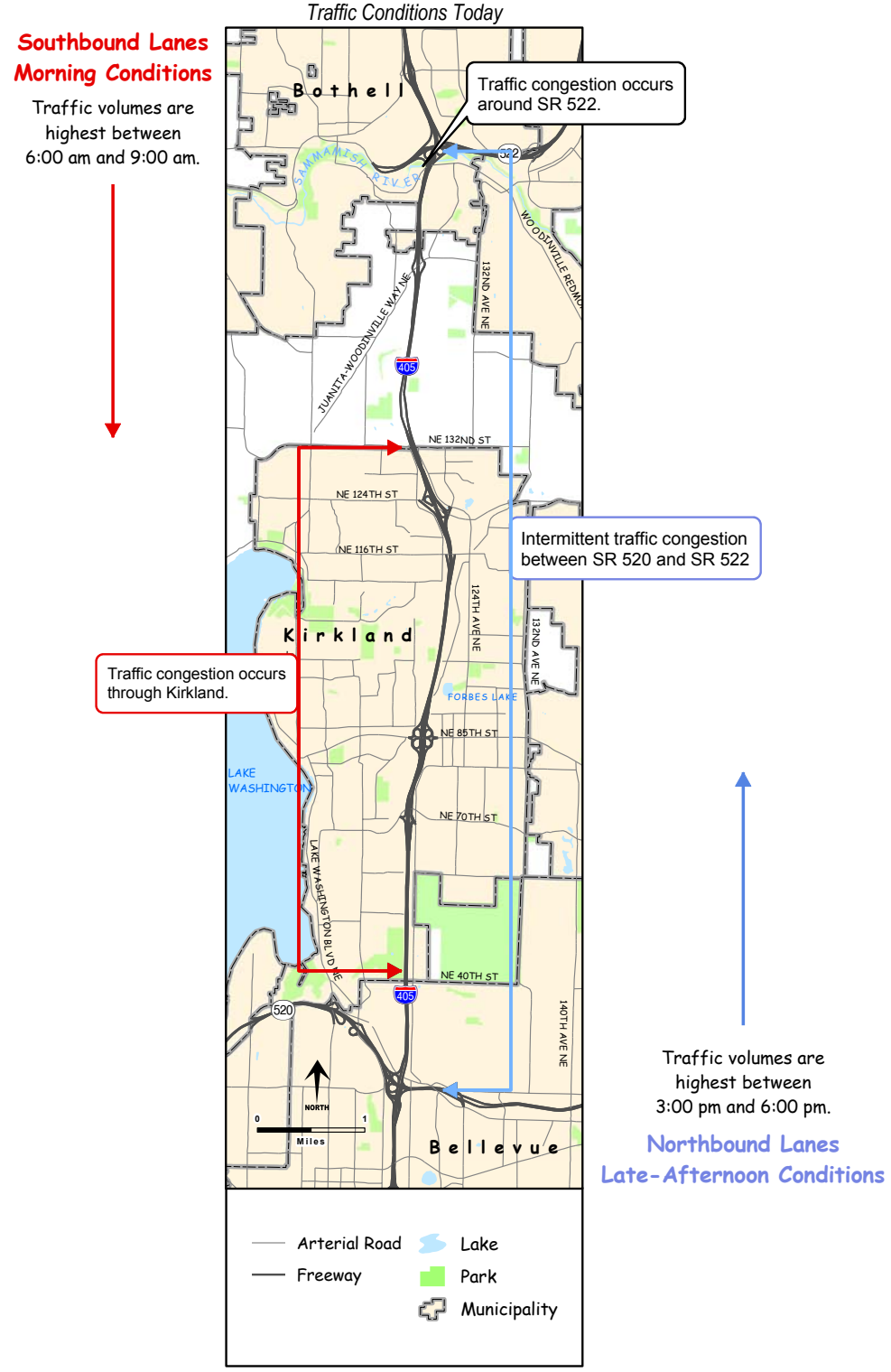


Exhibit 5-2
General-purpose Vehicles Traveling Through the Corridor
During the Morning Peak Hour

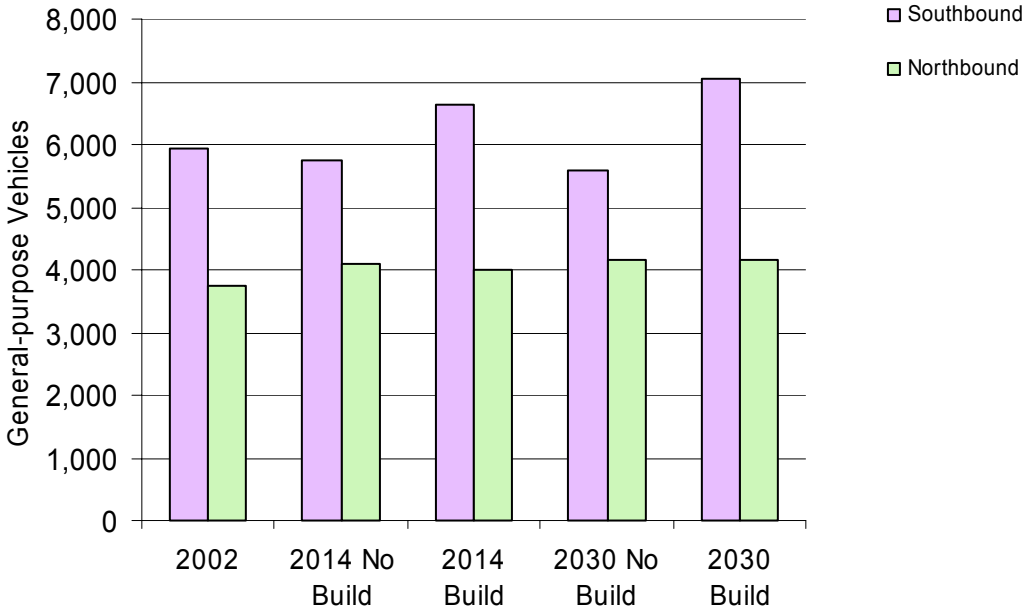
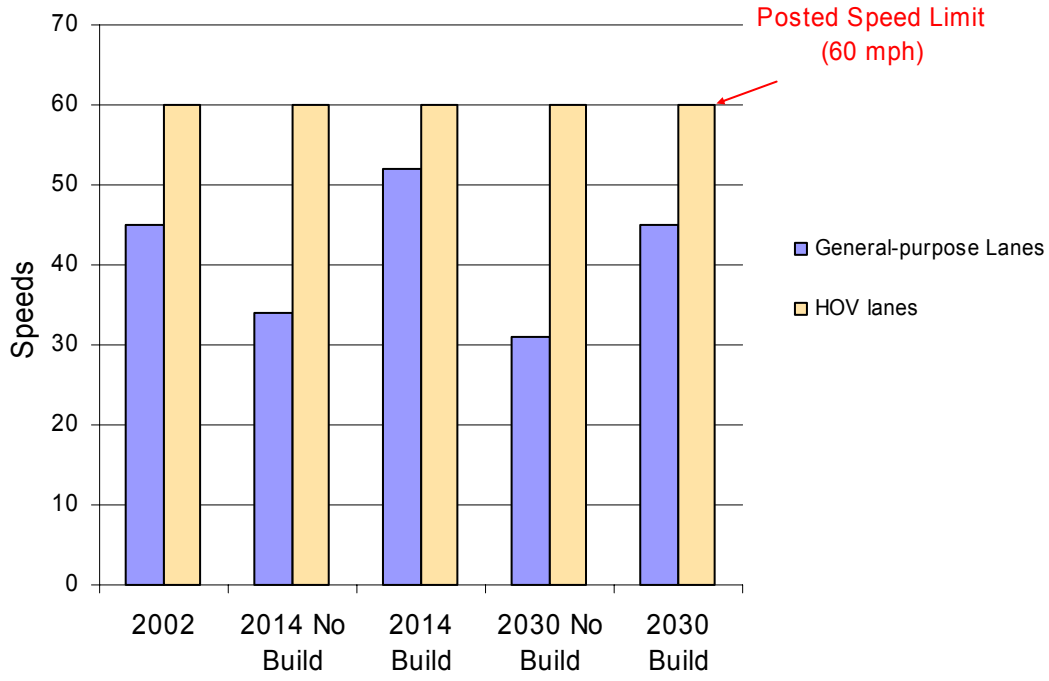


Exhibit 5-3
Southbound Travel Speeds
During the Morning Peak Hour



Build Alternative in 2014

The Kirkland Nickel Project will not eliminate traffic congestion 2014, but traffic conditions will be much better than if the project is not built. For example, with improvements, southbound I-405 volumes during the evening peak hour will increase by 500 to 900 vehicles per hour in the general-purpose lanes and average speeds will increase by more than 5 miles per hour. The HOV lane traffic volume and average speed will be similar to 2014 No Build conditions.

The proposed project reduces both the duration and extent of traffic congestion, especially through Kirkland.

No Build Alternative in 2030

In 2030, southbound morning peak-hour traffic conditions will be similar to that in 2014. The average speed in the general-purpose lanes will decrease to almost 30 miles per hour.

Build Alternative in 2030

In 2030, southbound peak period traffic conditions will be about 1,500 vehicles per hour greater in the general-purpose lanes than if the project is not built; speeds will be about 15 miles per hour higher. HOV lane traffic will continue to have an average speed of 60 miles per hour.

Northbound in the Evening

Today

Current northbound evening peak period traffic congestion is noticeably worse than during the morning southbound peak period. Traffic ranges between 5,300 and 6,500 vehicles per hour in the general-purpose lanes, and the average speed is just over 35 miles per hour. Use of the HOV lane is also higher than in the morning southbound peak period, but vehicle speeds are generally at the posted limit, 60 miles per hour. Exhibits 5-4 and 5-5 present a comparison between morning conditions for the Build and No Build general-purpose lane volumes and average speeds in general-purpose and HOV lanes.

Exhibit 5-4

General-purpose Vehicles Traveling Through the Corridor During the Evening Peak Hour

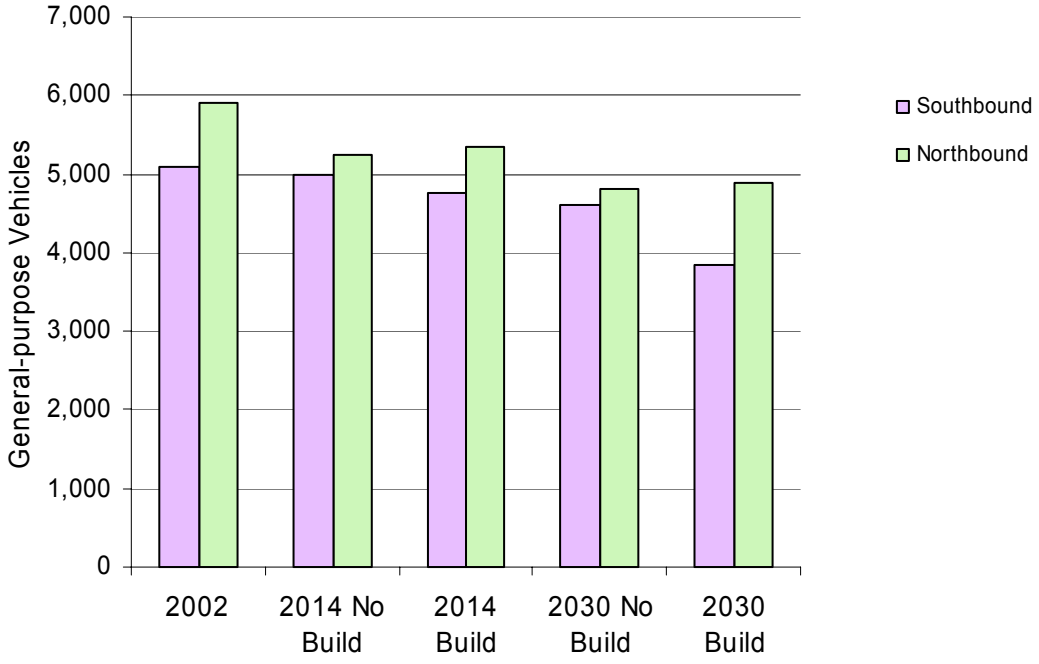
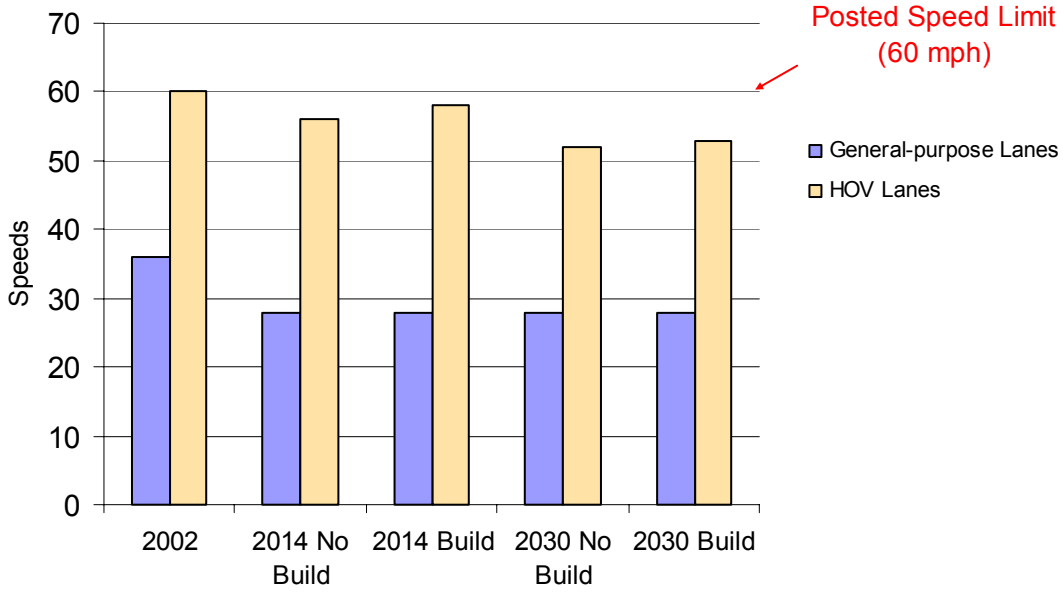


Exhibit 5-5

Northbound Travel Speeds During the Evening Peak Hour



No Build Alternative 2014

If we build nothing, the northbound peak-period congestion will continue to worsen. Most notably, the average vehicle speed in the general-purpose lanes will drop below 30 miles per hour. In addition, our models show that traffic will become increasingly slower as far south as I-90. HOV lane traffic will become somewhat slower with the average vehicle speed decreasing to about 55 miles per hour.

Build Alternative 2014

The only northbound mainline improvements to I-405 in the project area will occur between NE 70th Street and NE 124th Street, about 2.8 miles. In this area, there will be little difference between the Build and No Build alternatives. General-purpose, peak-period traffic will have an average speed below 30 miles per hour, and the average HOV lane speed will be about 55 miles per hour.

No Build Alternative 2030

Conditions in the general-purpose lanes will be similar to those in 2014, with an average speed below 30 miles per hour. The HOV lane peak hour traffic will increase by 250 to 300 vehicles compared with 2014 conditions; however, average speeds will drop to almost 50 miles per hour.

Build Alternative 2030

As noted above, the length of the northbound mainline lane addition is so short that traffic conditions will be only slightly better than the No Build conditions. The short-term benefits identified for 2014 will be mostly overcome by increased traffic volumes in 2030. Additional improvements to I-405 must be implemented to accommodate 2030 traffic volumes.

What about the reverse commute?

The northbound morning and southbound evening commutes, referred to as the reverse commutes, are currently free flowing through the Kirkland Nickel Project area. Northbound morning traffic will remain free flowing with either the No Build or the proposed project. However, the southbound evening commute will become worse with either the No Build or Build alternatives because of backups on SR 520. The serious traffic conditions that occur in this area cannot be alleviated without substantially greater changes to the freeway system (e.g., additional lanes and rapid transit improvements),

such as those proposed in other regional plans (see Chapter 3, Developing the Alternatives).

At the southbound off-ramp to NE 70th Street, WSDOT will add a new right-turn lane approximately 350 feet long that will provide additional vehicle queuing space so that vehicles will not back up onto I-405.

After WSDOT reconstructs the NE 116th Street interchange as a half single point urban interchange, traffic operations will be greatly improved. Today, there are long delays and vehicle queues during both the morning and evening commutes. The morning peak period routinely has delays of several minutes for westbound vehicles on NE 116th Street. Without improvements to the interchange, these delays will continue to get longer. The half single point urban interchange will also reduce delays and queues for eastbound vehicles at both the interchange and at the 120th Avenue NE/NE 116th Street intersection. With reconstruction of the interchange, year 2014 morning peak-period delays are projected to be less than a minute.

How does the project affect freight movements?

The peak-period congestion benefits will also apply to freight traffic. Because the majority of freight moves during off-peak hours, having more lanes available for general-purpose traffic in these time periods will improve traffic conditions for freight.

What safety improvements will be included in the Kirkland Nickel Project?

In the Kirkland section of I-405, the accident rate is 1.03 accidents per million vehicle miles, which is less than the average rate for the whole corridor of 1.48 million vehicle miles. During congested hours when there is bumper-to-bumper traffic, driver inattentiveness is a major cause of accidents. The Kirkland Nickel Project will increase freeway capacity and reduce congestion so that the number of accidents per vehicle mile will go down.

Despite the relatively low accident rate, the section of I-405 within the project area has 11 identified high-accident locations based on WSDOT's *2004 High Accident Review*. The project includes improvements that will reduce the accident rate at these high accident locations (Exhibit 5-6):

- At the northbound off-ramp at the NE 85th Street interchange, WSDOT will add a traffic signal to give more time for vehicles from the off-ramp to move onto NE 85th Street. The northbound off-ramp will be lengthened to prevent vehicle queues from backing up onto I-405.
- Where the southbound off-ramp to NE 85th Street merges with local traffic, WSDOT will rebuild approximately 200 feet of the off-ramp so that it will intersect with the NE 85th Street westbound through lanes at an angle closer to 90 degrees.

How does the project affect pedestrians and bicyclists?

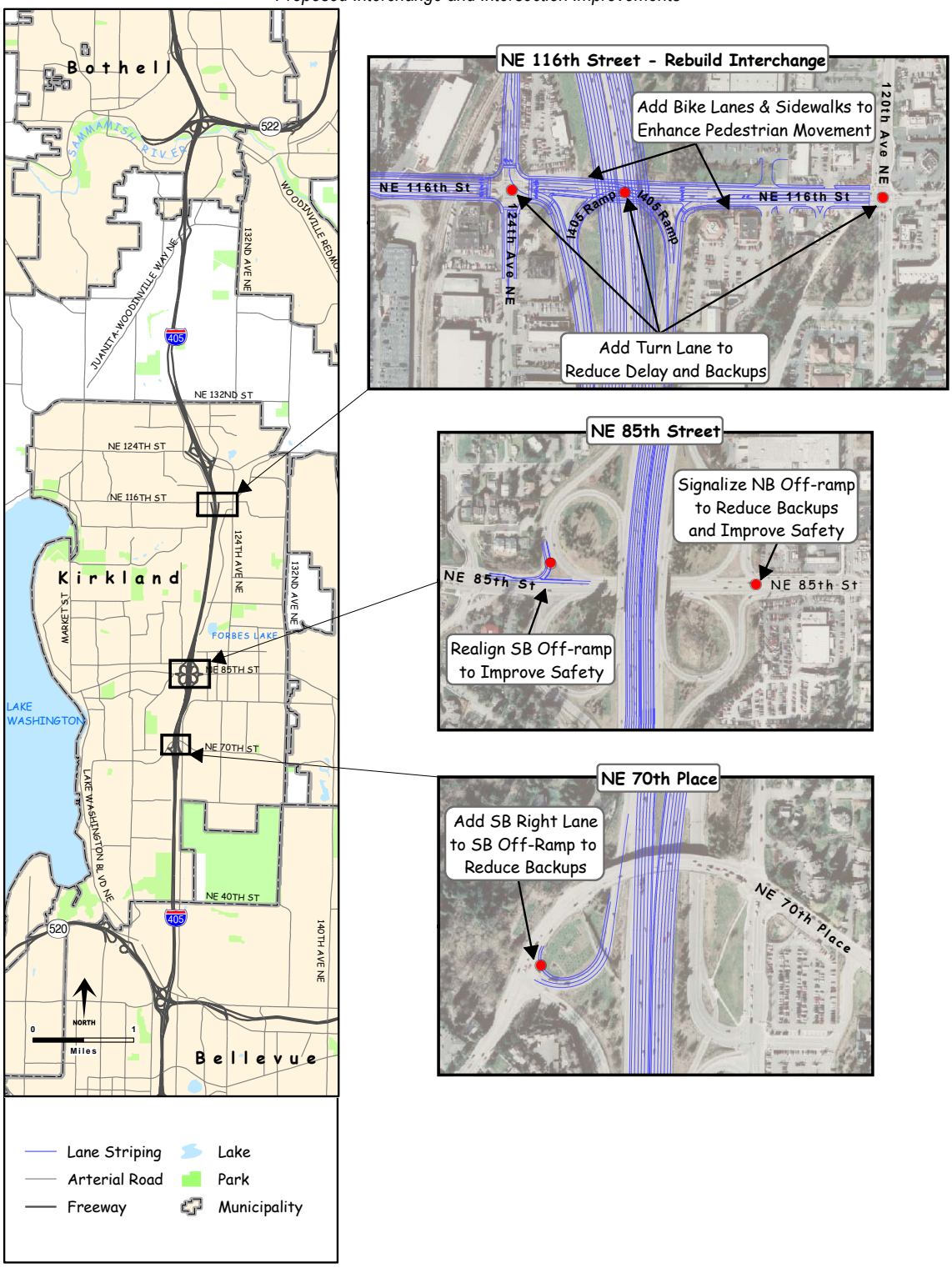
Pedestrians and bicyclists will benefit from the sidewalks and bicycle lanes that will be built along the NE 116th Street crossing beneath I-405. Currently, neither pedestrian traffic nor bicycle lanes are located on the south side of NE 116th Street between 120th Street NE and the east side of the interchange. These additions will greatly improve safety and accessibility for pedestrians and cyclists who wish to cross from one side of the freeway to the other.

How will construction activities affect the project area?

Mainline I-405 lanes may be shifted or re-aligned for widening or reconstruction. To accommodate these improvements, traffic lanes will be closed for short periods of time during the night and on weekends. These closures will be limited to the Kirkland Nickel Project area. The contractor will be required to prepare a traffic management plan prior to making any changes that will affect traffic flow, and the public and service providers will be notified before any changes are made. Further details on specific requirements of this traffic management plan are described below, as well as in the Kirkland Nickel Project Transportation Discipline Report in Appendix F.

Exhibit 5-6

Proposed Interchange and Intersection Improvements



What measures are proposed to avoid or minimize effects on traffic during construction?

- The contractor will prepare a traffic management plan (TMP) prior to making any changes to the traffic flow. The public, school districts, and emergency service providers will be informed of the changes ahead of time through a public information process.
- Prior to and during construction, WSDOT will implement strategies to manage the demand on transportation infrastructure. These transportation demand management (TDM) strategies will form an important part of the construction management program and will be aimed at increasing public awareness and participation in HOV travel.

5.2 Noise

Noise is sound that is perceived as unpleasant, unwanted, or disturbingly loud. Noise levels are a consideration in transportation projects because noise from construction activities and operation of a roadway can affect daily life. When roadway systems expand to add vehicle capacity, noise levels generally increase, which can interfere with conversations, work and family activities, and sleep. Prolonged or heightened exposure to noise can also result in hearing loss. The project team is working alongside local agencies and the public to evaluate and address traffic noise, ultimately lessening noise effects from the freeway.

Measuring noise in the project area

How were noise levels evaluated for the Kirkland Nickel Project?

WSDOT uses the Federal Highway Administration (FHWA) Traffic Noise Model to estimate traffic noise levels. To evaluate levels in the area, WSDOT obtained actual field measurements of current noise levels and current traffic volumes. We used the Traffic Noise Model to compare these data and to make noise projections for the future.

Please refer to the Kirkland Nickel Project Noise Discipline Report in Appendix G (on CD) for a complete discussion of the noise analysis.

How noisy is the project area?

WSDOT measured noise levels at 110 sensitive receptor sites. From these measurements and modeling data, WSDOT concluded that current noise levels in the project area range between 51 and 75 dBA. Further, current noise levels at 25 of the 110 sites either approach or exceed the FHWA noise abatement criteria of 67 dBA. According to WSDOT noise policy, "approaching FHWA noise abatement criteria" means 66 dBA. These 25 sites represent about 283 residences and other noise-sensitive uses.

What is FHWA's noise abatement criteria?

If future noise levels with a project are predicted to approach or exceed the FHWA noise criteria at a sensitive receptor, then mitigation is evaluated at the receptor. For residences, the criteria is 67 dBA.

How will project construction and operation affect noise?

Construction will be completed in phases, with each phase having its own noise characteristics depending on the types of equipment being used. Roadway construction, for instance, will involve clearing, cut-and-fill (grading), removing old pavement, importing fill, and paving.

What are sensitive receptors?

Sensitive receptors represent all land use activity categories where the FHWA noise abatement criteria specify exterior and interior noise levels. Land use activity categories include residences, recreation areas, hotels, schools, churches, libraries, and hospitals.

For the duration of the project, the most prevalent source of noise will be from engines. The loudest noises will be from high-impact equipment, such as jack hammers and pile drivers (if allowed by resource agencies).

How will the completed project affect noise levels?

WSDOT compared future traffic noise levels to the FHWA noise abatement criteria[1] to estimate traffic noise impacts for the proposed project. For all locations that exceeded the FHWA criteria, the effectiveness of noise walls to reduce the noise was evaluated. Exhibit 5-7 on the following page shows a comparison of noise levels for today, the proposed project in 2030, and the No Build Alternative.

To include a noise wall in a project, the wall must meet criteria for both feasibility and reasonability. To be feasible, a noise wall must be constructible to achieve a noise reduction of at least 7 dBA at one or more sensitive receptors, and a reduction of at least 5 dBA at most of the first row of sensitive receptors. To be reasonable, the wall must both be wanted by the sensitive receptors that would benefit from the wall and must be cost-effective, by benefiting a sufficient number of sensitive receptors to justify the cost of the wall. The allowable cost per benefited receptor is established in WSDOT policy and depends on the level of traffic noise.

How loud are the noises we hear every day?

Soft whisper from 15 feet
30 dBA

Television from 10 feet
60 dBA

Freeway traffic from 50 feet
70 dBA

City bus from 50 feet
80 dBA

Jet airliner from 200 feet
120 dBA

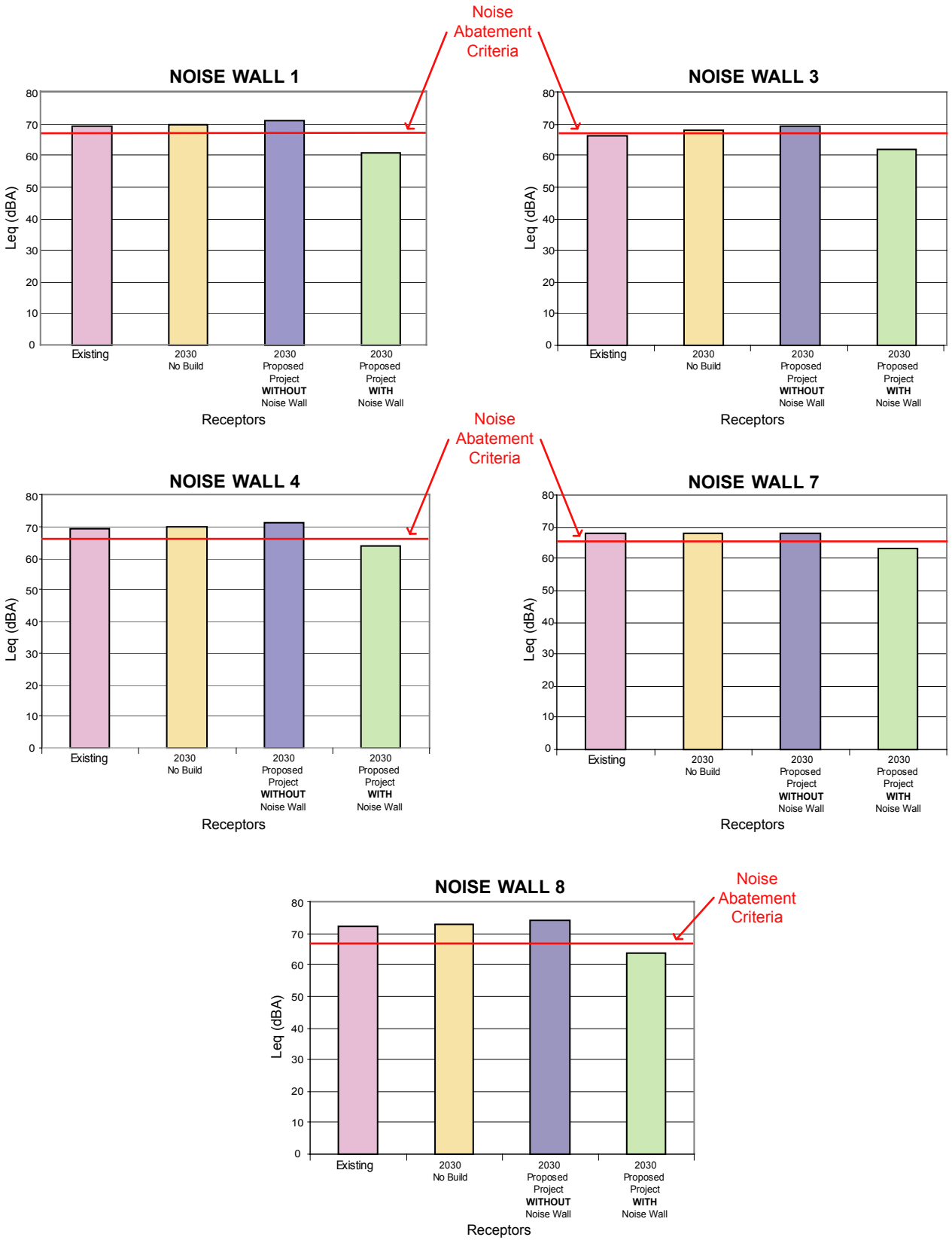
Severe noise impacts occur when traffic noise levels exceed 75 dBA at sensitive receptors or when predicted future noise levels exceed existing levels by 15 dBA or more as a result of the project. With the proposed noise walls, no predicted levels would exceed 75 dBA and no increases of 15 dBA or greater would occur. Consequently, the project would not cause any severe noise impacts.

For the Build Alternative, modeling indicates that without the recommended walls noise levels will approach or exceed the noise abatement criteria at 38 sites representing an equivalent of 365 residences. Noise levels at 25 of these 38 sites currently approach or exceed the FHWA criteria. The Build Alternative includes construction of several noise walls that would substantially reduce noise levels at 19 of the 38 sites predicted to approach or exceed the noise abatement criteria; however,

[1] The FHWA noise abatement criteria are the noise levels that, if needed, require the evaluation of mitigation. For residences, the level is 67 dBA.

Exhibit 5-7

Noise Levels



I-405 at NE 60th Street, where a new noise wall will be constructed.

noise levels at four of the 19 benefited sites would continue to approach or exceed the criteria. As a result, with the proposed noise walls, noise levels at 21 sites will continue to approach or exceed the abatement criteria. At these sites, noise walls and other noise abatement measures were evaluated, but they would not be feasible or reasonable. None of the noise impacts at the 21 remaining sites would be severe (exceeding 75 dBA) under WSDOT's criteria.

What measures are proposed to avoid or minimize noise effects during construction?

To reduce construction noise at nearby receptors, the following measures will be incorporated into construction plans and specifications:

- Erecting noise berms and barriers prior to other construction activities to provide noise shielding;
- Limiting the noisiest construction activities, such as pile driving (if allowed by resource agencies), to between 7 AM and 10 PM to reduce construction noise levels during sensitive nighttime hours;
- Outfitting construction equipment engines with adequate mufflers, intake silencers, and engine enclosures to reduce their noise by 5 to 10 dBA (US EPA, 1971);
- Turning off construction equipment during prolonged periods of nonuse to eliminate noise;
- Requiring contractors to maintain all equipment and train their equipment operators in good practices to reduce noise levels;
- Locating stationary equipment away from receiving properties to decrease noise;
- Constructing temporary noise barriers or curtains around stationary equipment that must be located close to residences, to decrease noise levels at nearby sensitive receptors;
- Requiring resilient bed liners in dump trucks to be loaded on site during nighttime hours; and
- Requiring contractors to use OSHA-approved ambient sound-sensing backup alarms that could reduce disturbances from backup alarms during quieter periods.

Exhibit 5-9: Noise Wall Locations

Identifier	Location	Approximate Length (feet)	Approximate Height (feet)
New noise walls to be constructed			
NW1	Along the eastern edge of the I-405 right of way along the NE 160th Street northbound on-ramp to 118th Avenue NE	1,280	20
NW3	Along the western edge of the I-405 right of way between NE 132nd Street and 113th Avenue NE	1,680	18
NW4	Along the western edge of the I-405 right of way between the north end of the existing wall west of I-405 in the NE 95th Street vicinity and NE 100th Street	920	16
NW7	Along the eastern edge of the I-405 right of way between NE 80th Street and the off-ramp to NE 85th Street	735	20
NW8	Along the eastern edge of the I-405 right of way between NE 60th Street and the existing noise wall south of NE 67th Place	500	18
Noise walls to be relocated			
NW2	Along the western edge of the I-405 right of way between NE 144th Street and the vicinity of NE 149th Street	1,565	16
NW5	Along the eastern edge of the I-405 right of way beginning at the end of the northbound 85th Street on-ramp and ending at NE 97th Street.	1,325	16
NW6	In the vicinity of the receptor at 11638 NE 92nd Street on the west side of I-405	390	16-20
NW9	Along the western edge of the I-405 right of way between NE 53rd Street and NE 65th Street	700	8

Exhibit 5-8
Location of New or Relocated Noise Walls

What measures are proposed to avoid or minimize noise effects during operation?

New noise walls will be constructed at five locations provided that adjacent residents agree and that wall construction is feasible from an engineering perspective (noise wall locations are shown in Exhibits 5-8 and 5-9). Four existing noise walls will be relocated at or closer to the right of way.

5.3 Land Use Patterns

Land use planning helps to create and maintain vital communities with close-knit neighborhoods, a sustainable economy, protected natural systems, and an efficient public infrastructure. Balancing transportation and other land use needs through planning helps communities realize their visions. Local land use directly influences traffic patterns, which, in turn, help shape the project design and development.

Kirkland townhouses under construction

How do communities in the project area influence where to locate businesses and residences?

Many municipalities plan for growth at the citywide and neighborhood level. Citywide plans provide overall policy guidance for future development and address topics such as land use, housing, parks and open space, public infrastructure, and the environment. Neighborhood plans allow for a detailed examination of issues affecting smaller geographic areas within the municipality. The cities of Kirkland, Bellevue, and Bothell, as well as King County, have comprehensive plans that describe how their neighborhoods should evolve over time. Those same neighborhoods depend daily on the freeway, transit, and connecting arterial transportation systems that serve them. For these reasons, it is important that the Kirkland Nickel Project be consistent with community plans.

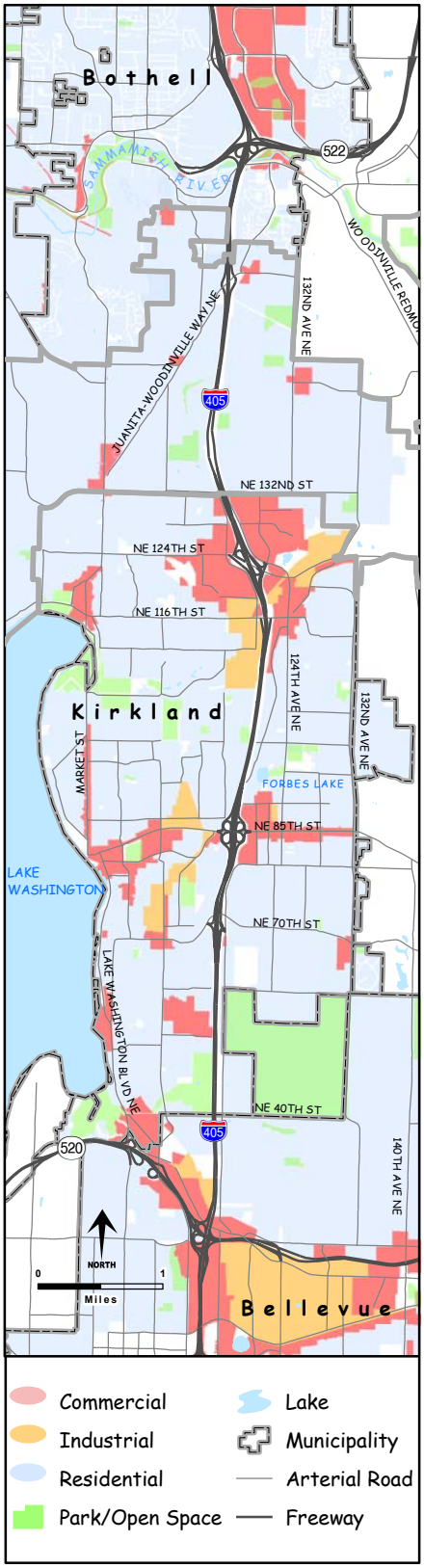
Please refer to the Kirkland Nickel Project Land Use Plans and Policies and Land Use Patterns discipline reports in Appendices H and I (on CD) for a complete discussion of land use analysis.

As shown in Exhibit 5-10, the communities have planned for commercial land uses to occur at the I-405 interchanges. This is because visibility, ease of access, and volume of pass-by traffic are important factors to many businesses.

People in residential areas, however, desire low volumes of traffic on their streets. Higher commuter or cut-through traffic volumes on residential streets can create traffic congestion, noise, air quality, safety, and parking issues within neighborhoods.

Park-and-Ride facility near NE 116th Street

Exhibit 5-10
Land Use Patterns



How can traffic patterns affect businesses and residences?

Changing traffic patterns can have positive or negative effects on business success and residential appeal. The types of businesses in a commercial area may change in response to changing traffic patterns and accessibility. For example, a service station and a professional office require different traffic patterns and accessibility.

Land use activity in a residential area that experiences a high level of traffic may eventually change to a higher intensity use (i.e., multi-family, commercial, or a mix of the two). This type of change, however, can be influenced by other factors including economics, political climate, zoning, and comprehensive plan designations.

How will the Kirkland Nickel Project affect the location of businesses and residences in the project area?

A beneficial effect on the existing land use in the project area will occur as a result of transportation system improvements. WSDOT expects that the widening of I-405 will alleviate some of the vehicular congestion on adjacent local streets. Easier access and better traffic flow on I-405 will encourage commuters to use the freeway instead of seeking alternative routes on local streets.

5.4 Communities, Neighborhoods, and Businesses

Communities, neighborhoods, and businesses are the heart of a region's social identity and economic vitality. Studying the social and economic effects of the Kirkland Nickel Project is important to maintaining the area's unique characteristics, as well as nurturing its living and business environments.

Local commuters

What types of data were analyzed for the project?

WSDOT conducted analyses of regional and community growth, employment, housing, and the local business environment. In addition, we also evaluated potential project effects on minority and low-income populations, such as changes in travel patterns, accessibility to community facilities, or availability of affordable housing.

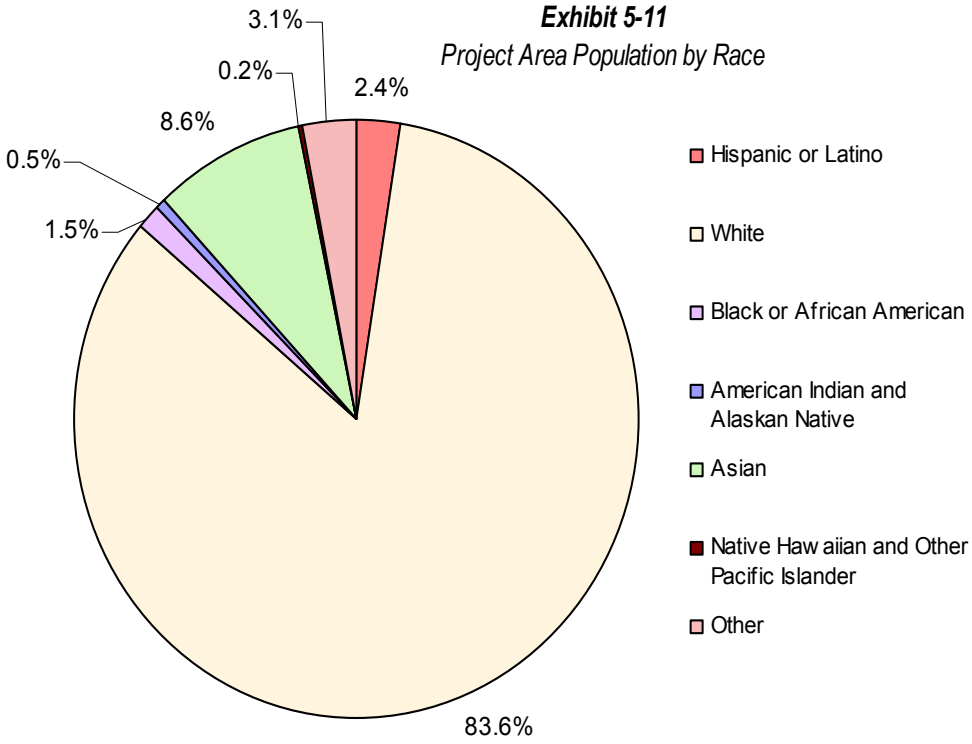
Data from the 2000 Census were used to describe current socioeconomic characteristics of the population. Information tabulated by the Puget Sound Regional Council's forecast analysis zones was used to typify historical and projected characteristics. Since the size and shape of Census tracts and forecast analysis zones are irregular, the width of the study area on either side of I-405 varied to some extent.

Please refer to the Kirkland Nickel Project Economics, Environmental Justice, and Social Elements discipline reports in Appendices J, K, and L, respectively (on CD), for a complete discussion of these analyses.

Who lives in the project area?

The population within the Kirkland Nickel Project area is becoming more diverse. While the people are predominantly white, more racial diversity is apparent today than in 1990. In 1990, approximately 7 percent of the population was non-white, compared to about 17 percent in 2000 (see Exhibit 5-11). This increased diversity provides the foundation for the interesting and healthy communities that surround the project area.

Exhibit 5-11
Project Area Population by Race



What community and social services are found in these communities?

The cities of Bellevue, Kirkland, and Bothell support formal and informal community organizations that encourage citizen participation. Organizations such as neighborhood groups, youth service providers, business associations, social and recreational organizations, and service groups are all part of the community. The City of Kirkland Parks and Community Services Department provides a variety of recreational programs including the Senior Center, classes for adults and children at the North Kirkland Community Center, and maintenance of the ballfields. The City of Bothell Recreation Section provides a variety of recreational opportunities including structured classes, teen events, adult sports, and youth camps.

Two of the notably larger community facilities in the project area are the Peter Kirk Park in Kirkland and the Park at Bothell Landing in Bothell. Both provide a venue for a range of social activities including senior centers, teen centers, performance centers, community celebrations, concerts, and recreational activities.

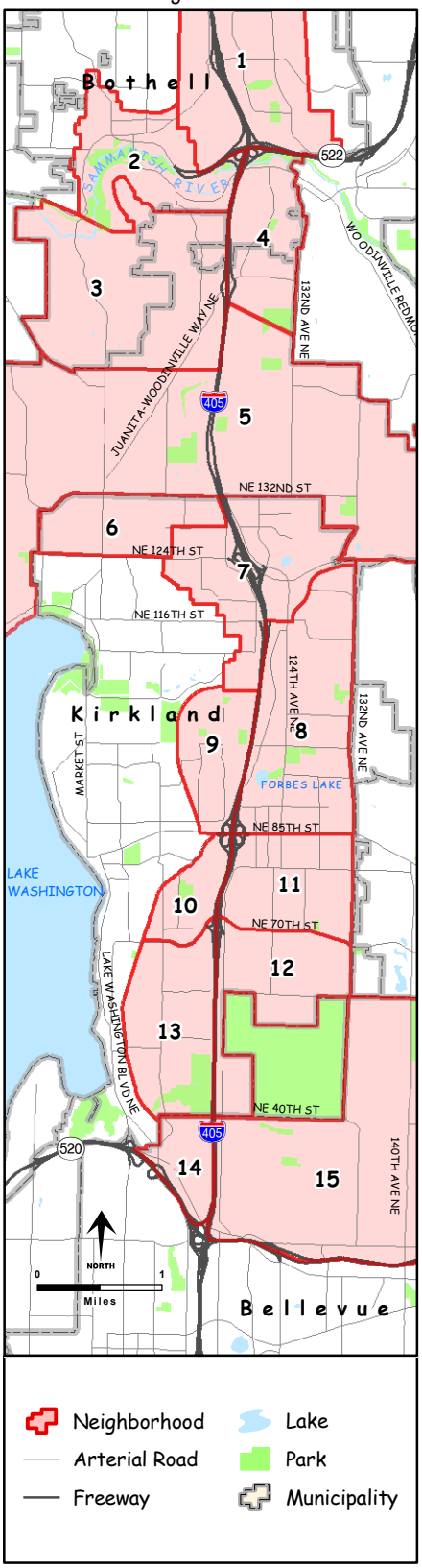
Neighborhoods

Fifteen neighborhoods, located within four jurisdictions, are adjacent to the I-405 mainline. Shown in Exhibits 5-12 and 5-13, they include:

Exhibit 5-12: Kirkland Nickel Project Neighborhoods

	Neighborhood	Jurisdiction
1	North Creek/ 195th	Bothell
2	Downtown/ 190th/ Riverfront	Bothell
3	Waynita/Simonds/ Norway	Bothell
4	Brickyard/ Queensgate	Bothell
5	Kingsgate/ North Juanita	King County
6	North Juanita	Kirkland
7	Totem Lake	Kirkland
8	North Rose Hill	Kirkland
9	Highlands	Kirkland
10	Everest	Kirkland
11	South Rose Hill	Kirkland
12	Bridle Trails	Kirkland
13	Central Houghton	Kirkland
14	North Bellevue	Bellevue
15	Bridle Trails	Bellevue

Exhibit 5-13
Neighborhoods



These neighborhoods include churches, schools, developed recreational facilities and undeveloped open space. There are pedestrian and bicycle facilities on several streets adjacent to and spanning I-405, including three bridges over I-405 for non-

motorized and emergency vehicle use only (NE 60th Street, NE 80th Street, and NE 100th Street).

Population

Most of the rapid population growth in the Kirkland Nickel Project area occurred during the 1970s and 1980s. During that time, employment, the number of households, and traffic volumes increased dramatically. More recently, the project area has experienced relatively slow population growth, a trend that is expected to continue because much of the land is already developed. Exhibit 5-14 shows historical and projected population in the project area.

HEADLINES THROUGH THE YEARS

Census Count Gives Kirkland and Vicinity Substantial Gain
Eastside Journal
May 1, 1930

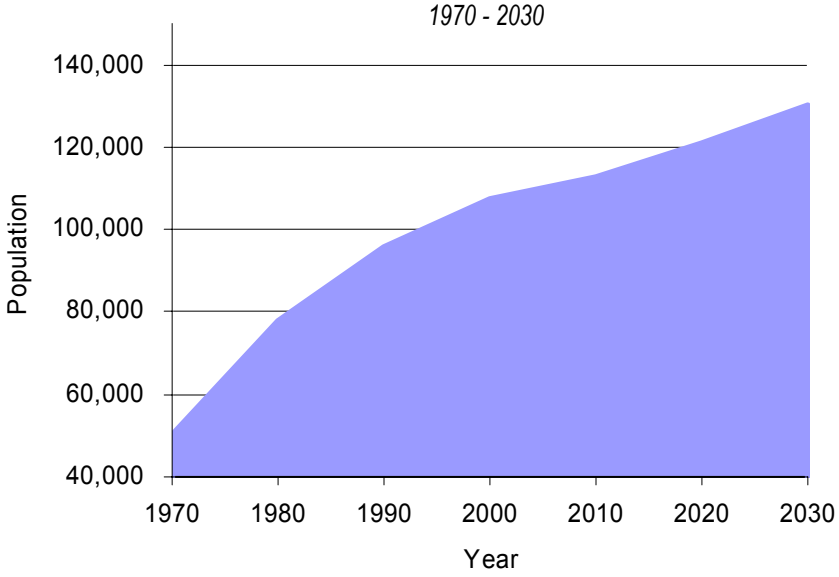
Kirkland Doubles Population in Decade to 4,500
Eastside Journal
June 8, 1950

East Side Population May Zoom to 300,000
Eastside Journal
September 3, 1959

Kirkland Gains 249 Residents Over 15,000 City Estimate
Eastside Journal
March 10, 1971

I-405 Dedication Scheduled November 5
Eastside Journal
October 29, 1969

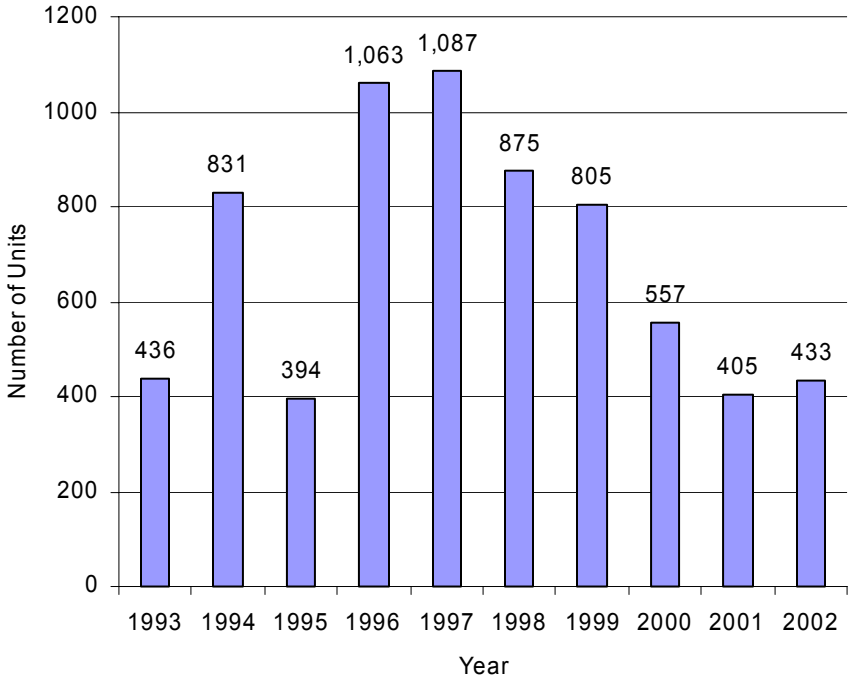
Exhibit 5-14
Population Growth in the Area: 1970 - 2030



Housing

Housing changes for Census tracts (approximately one mile on either side) between 1993 and 2002 indicate that nearly 9,000 new residential units were permitted within the Kirkland Nickel Project area. Given the current zoning regulations and availability of land, the area has the capacity for over 28,500 new housing units, including single- and multi-family residential, and multi-use residential (Exhibit 5-15).

Exhibit 5-15
Housing Units Authorized by Permit

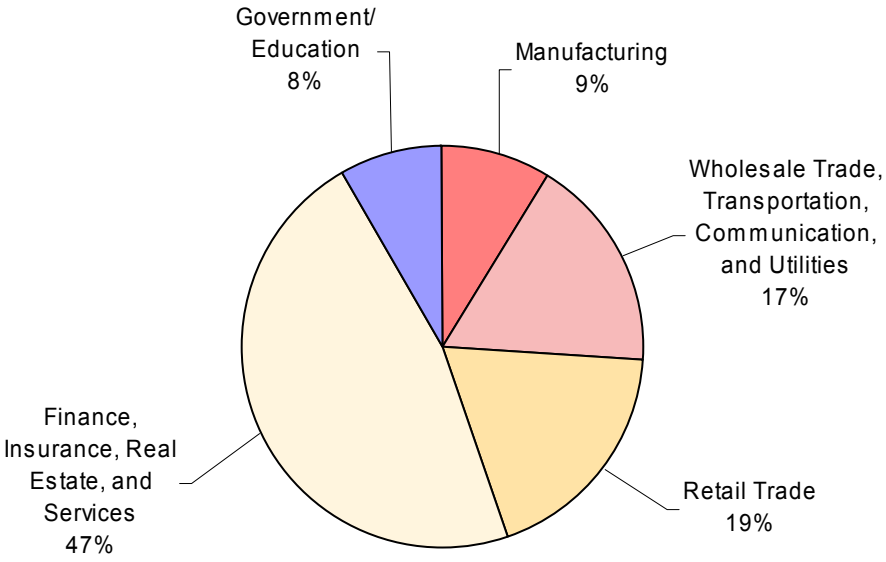


Business and Employment

The principal economic areas potentially affected by the Kirkland Nickel Project include the Finn Hill, Juanita, and Kingsgate neighborhoods of unincorporated King County; and the cities of Bellevue, Kirkland, Woodinville, Bothell, and Redmond. Combined, the five cities served as home to firms employing 255,000 employees in 2002, or 16 percent of the Central Puget Sound region's total employment (King, Kitsap, Pierce, and Snohomish counties). Commercial activity in these cities is dominated by activity in the Finance, Insurance, Real Estate and Services sector (FIRES) of the economy, but the affected cities also support a wide range of retail activity in Kirkland and Woodinville, and a regional retail destination in Bellevue immediately to the south of the Kirkland Nickel Project area. Exhibit 5-16 shows the share of employment per major sector for the project area. The relative shares of employment by sector are generally similar to King County as a whole, with a slightly greater emphasis on FIRES.

Exhibit 5-16

Employment by Sector in the Project Area: 2000



How will the project affect communities, neighborhoods, and businesses?

The Kirkland Nickel Project will have minor effects on communities and people within the project area, and most of these effects will be beneficial. The Context Sensitive Solutions design principles to be used will help make the project fit aesthetically with the community. Periods of congestion will be shortened in the Kirkland area and the reconfiguration of the interchange at NE 116th Street will make it operate more efficiently. Improvements to the northbound and southbound off-ramps at NE 85th Street will make merging with local traffic safer.

Communities and neighborhoods

WSDOT's analysis shows that community integrity will remain intact during operation of the Kirkland Nickel Project because neighborhoods in the vicinity of I-405 are already well established. Access to community facilities and recreational areas will remain unchanged. Pedestrian and bicycle facilities

will also remain unaffected except for improvements at the NE 116th Street interchange.

Minority and low-income populations

The Kirkland Nickel Project will not have disproportionately high and adverse effects on minority or low-income populations, or resources/services that are especially important to a minority and/or low-income populations. The details of WSDOT's analysis can be found in the Kirkland Nickel Project Environmental Justice Discipline Report found in Appendix I on CD.

WSDOT conducted numerous outreach efforts to reach minority, low-income, and other special groups to convey information about the Kirkland Nickel Project. WSDOT did this outreach, also known as "environmental justice" outreach to ensure that the project would not disproportionately affect minority or low-income populations. Most minority and/or low-income residents who provided feedback were glad that action will be taken to improve traveling conditions on I-405.

Most minority and/or low-income residents that were contacted for this study used I-405 to get to work or to access public services. They found traveling difficult when the freeway was congested. In general, these residents:

- Appreciated that WSDOT reached out to contact them;
- Seemed pleased that something was being done to improve traffic congestion on I-405;
- Recognized that there was a traffic problem and that it affected their daily lives—congestion on I-405 frequently made them late for appointments for essential services such as health care, and for more routine activities such as grocery trips;
- Expressed concern over potential interruptions in bus service and that comfortable bus trips were a major concern;
- Acknowledged that I-405 congestion and subsequent delays were less important in their lives when compared to other economic concerns.

Businesses

The project will have modest, positive effects on access to the commercial areas through year 2014. However, the overall

What is environmental justice?

The term *environmental justice* is relatively new; however, the issues related to the concept have been in public discussion for decades. Essentially, environmental justice is the simple, common sense notion that the negative environmental effects of projects should not disproportionately burden low income or minority communities. Executive Order 12898, issued by President Clinton in 1994, provides that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations."

accessibility benefits will stabilize beyond 2014 as traffic volumes continue to increase. The project will have long-term, indirect benefits to the local economy because of improved mobility throughout the corridor.

How will communities, neighborhoods, and businesses be affected by construction activities?

Construction of the Kirkland Nickel Project is expected to last up to six years; however, construction activity in any one location will take substantially less time. Construction will pose some minor inconveniences because of localized travel delays, changes in some business access, possible parking reductions, and traffic re-routing. Access to some businesses may become slightly more difficult during construction of the NE 116th Street interchange, causing some customers temporarily to go elsewhere or postpone their trips. Some travelers may choose alternate routes to avoid construction activity. These detours and delays will be of short duration and highly localized; they will not affect social interaction or the economic vitality within local neighborhoods or the project area.

Will existing properties be acquired or displaced?

Right of Way and Easements

Although most of the Kirkland Nickel Project will be constructed in existing right of way, WSDOT will need to acquire property and easements in several areas (see Exhibits 5-17 and 5-18). These areas are adjacent to:

- The Brickyard Park-and-Ride and the west side of I-405 at NE 145th Street;
- In the vicinity of the NE 116th Street interchange; and
- Near East Riverside Drive in Bothell.

In total, WSDOT will need to acquire approximately 5.28 acres for right of way and stormwater runoff detention ponds for the project. In addition, property will be acquired for wetlands mitigation at three or more locations.

Brickyard Park-and-Ride

WSDOT will acquire 2.1 acres of property near the Brickyard Park-and-Ride from King County Metro to construct a new southbound on-ramp from NE 160th Street and a detention

pond. The land is currently vacant and is partially covered by a wetland. A full acquisition and relocation of one residence will be necessary for the construction of a detention pond.

NE 116th Street Interchange

In the vicinity of the I-405 and NE 116th Street interchange, WSDOT will acquire approximately 0.75 acres of property from twelve property owners along NE 116th Street west of the interchange. The purpose of these acquisitions will be to widen and add turn lanes on NE 116th Street and 120th Avenue NE. Full acquisition and relocation of a transmission repair service may be necessary. Partial acquisitions and easements of narrow strips of property will be necessary from the other eleven parcels; these acquisitions will not affect the operations of those businesses during construction or operation. The partial acquisitions are small and will not change site use with respect to local land use code. On the east side of the interchange, the widening of NE 116th Street will take place within existing City of Kirkland right of way; WSDOT will not acquire additional property at this location.

NE 116th Street and 120th Avenue NE, where widening of turn lanes will require some property acquisitions

East Riverside Drive

A full acquisition and relocation of one residence will be necessary in the vicinity of Riverside Drive. Easements will be necessary from the other five properties in this area.

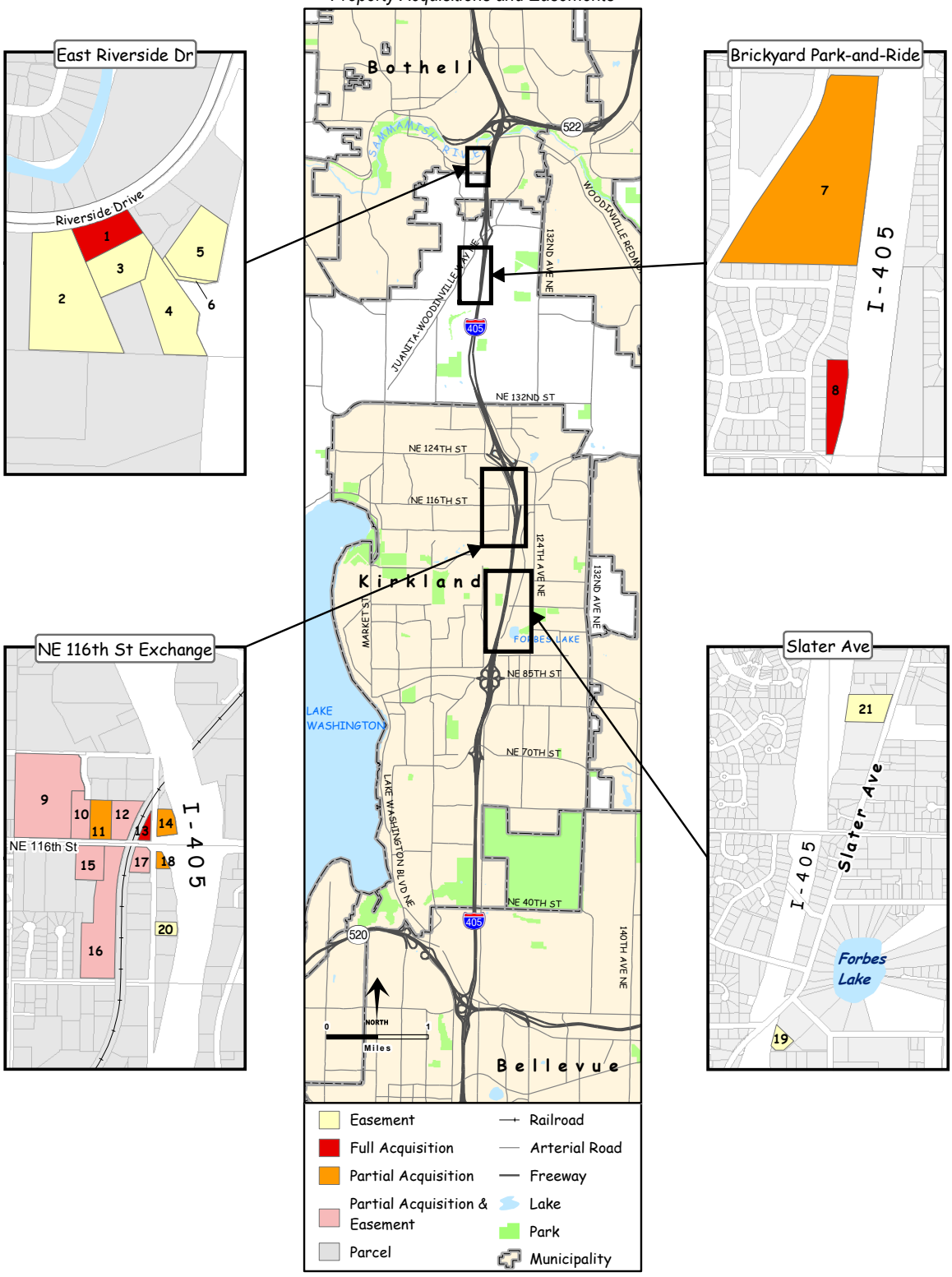
WSDOT will also acquire 7.6 acres of land for wetlands mitigation and enter into a Memorandum of Agreement with the City of Kirkland to use 4.5 acres of city property for wetland mitigation.

Exhibit 5-17: Property Acquisitions and Easements

No.	Purpose of Acquisition or Easement	Current Land Use	Parcel Size (sq. ft.)	Acquisition Area (sq. ft.)	Easement Area (sq. ft.)
1	Detention Pond	Residential	40,042	40,042	NA
2	Temporary Construction Easement	Residential	143,748	NA	1,923
3	Detention Pond	Residential	53,583	NA	2,864
4	Detention Pond	Residential	74,052	NA	6,175
5	Temporary Construction Easement	Residential	63,395	NA	4,611
6	Temporary Construction Easement	Vacant	4,500	NA	2,785
7	Detention Pond Roadway Slopes	Future Park-and-Ride Expansion	794,099	91,940	NA
8	Detention Pond	Residential	65,340	65,340	NA
9	Roadway Widening	Light Industrial	460,865	1,375	13,735
10	Roadway Widening and Subterranean Easement	Vacant	81,893	2,463	6,442
11	Roadway Widening	Commercial	73,616	4,162	1,804
12	Roadway Widening	Commercial	81,000	3,489	2,455
13	Roadway Widening	Transmission Shop	17,000	17,000	NA
14	Roadway Widening	Car Dealership	41,726	321	NA
15	Roadway Widening	Car Dealership	86,528	135	162
16	Roadway Widening	Commercial	296,505	2,018	956
17	Roadway Widening	Commercial	42,361	1,344	4,510
18	Roadway Widening and Temporary Construction Easement	Truck Refueling	14,240	401	NA
19	Noise Wall	Costco Parking Lot	32,050	NA	7,958
20	Temporary Construction Easement	Commercial	27,300	NA	6,234
21	Temporary Construction Easement	Vacant	111,514	NA	1,113
22	Wetland Mitigation[1]	Wooded	215,819		215,819[2]
23	Wetland Mitigation[1]	Lawn	136,495	136,495	
24 and 25	Wetland Mitigation[1]	Wooded	202,118	202,118	

[1] See Exhibit 5-40 for the location of these sites.
[2] City of Kirkland property.

Exhibit 5-18
Property Acquisitions and Easements



What measures are proposed to avoid or minimize effects to communities, neighborhoods and businesses during construction?

To reduce the effects of construction activities on neighborhoods and businesses, the following measures will be incorporated into construction plans and specifications.

Communities and neighborhoods

- The contractor will be required to prepare and implement a traffic management plan (TMP). If local streets must be temporarily closed during construction, detour routes will be provided and clearly marked with signs.
- The contractor will coordinate with the school districts before construction. The TMP will be implemented and coordinated with all emergency services organizations prior to any construction activity.
- The contractor will coordinate with utility providers prior to construction to identify conflicts and resolve the conflicts prior to or during construction.

Freight movement in the I-405 Corridor

Businesses

Construction Interference

- The contractor will be required to maintain access to businesses throughout the construction period.
- Because it can be difficult to determine whether a business is open, or how to access the site during the construction period, the contractor will make provisions for posting appropriate signs to communicate the necessary information to potential customers.
- The contractor will keep daytime street closures to a minimum.

Displacements

- In those situations where it is necessary to acquire property, WSDOT will conform to the requirements set forth in accordance with the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended and implemented by FHWA under 49 CFR Part 24, and according to Chapter 468-100 WAC Uniform Relocation and

What is the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970?

On January 2, 1971, Public Law 91-646, the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970," (Uniform Act) was signed into law. The Uniform Relocation Act provides important protections and assistance for people affected by federally-funded projects. This law was enacted by Congress to ensure that people whose real property is acquired, or who move as a result of projects receiving federal funds, will be treated fairly and equitably and will receive assistance in moving from the property they occupy.

Assistance and Real Property Acquisition. This will ensure just compensation of all properties and have a minimal effect on the current owners and residents. Relocation resources are available, without discrimination, to all eligible residential and business relocates.

- WSDOT will prepare a relocation plan in advance of actual displacements. Additional information will be collected, possibly through property owner interviews, to identify the specific needs of any business that will be relocated.

5.5 Recreational and Cultural Resources

Citizens appreciate recreational resources because they help to improve the quality of life within our communities. Public spaces that are enjoyable, accessible, and diverse in their social and recreational functions enrich minds, bodies, and spirits.

Likewise, cultural and historic resources provide an important link to the past while establishing meaningful connections to lives today. They serve as memories and symbols of a community's accomplishments and represent the distinctive architectural, landscape, and engineering designs of our region.

Cycling in the project area

Please refer to Appendix M (on CD) for a complete discussion of historic, cultural, and archaeological resources analyses. In addition, Appendix N provides an evaluation of Section 4(f) resources.

What recreational, historic, and cultural resources are located within the project area and how will they be affected?

WSDOT identified nearby recreational, historic, cultural, and archaeological resources within the Kirkland Nickel Project. No historic or cultural resources were found that could be affected by the project. However, four recreational resources (parks) were identified that were close enough to the proposed project to be evaluated for effects from construction or operation as part of Section 4(f) and Section 6(f) analysis. Exhibit 5-19 depicts these four parks, the agencies that own them, and the types of recreational activities offered. Exhibit 5-20 shows the locations of the parks on a regional map.

Below we have provided a description of each park, as well as a description of the closest construction activities. Our evaluation shows that there will be no effects to the parks.

What is Section 4(f)?

Section 4(f) of the US Department of Transportation (USDOT) Act of 1966 49 USC 303 provides that the proposed use of any land from a major publicly-owned park, recreational area, wildlife and waterfowl refuge, or any important historic site, will not be approved by the USDOT unless a determination is made that there is no feasible and prudent alternative to the use of land from that property. The Act also requires that the proposed action include all possible planning to minimize harm that may result from such use.

Exhibit 5-20
Recreational and Historic Resources

Exhibit 5-19: Recreational Resources in the Project Area

	Park	Jurisdiction	Facility Type
1	Kingsgate	King County	Trail
2	Edith Moulton	King County	Park (Closed)
3	Spinney Homestead	Kirkland	Playfields, Picnic Area, Playground
4	Watershed	Kirkland	Undeveloped Open Space

What are the characteristics of local parks and will they be affected by the project?

To understand whether recreational activities may be disrupted as a result of the Kirkland Nickel Project, we examined the specific characteristics of the four parks adjacent to the project area. In addition, we identified the construction activities that will take place near the parks. Finally, we looked for long-term impacts to the parks once the project was complete, such as noise increases.

Kingsgate Park (1) is a 7-acre, King County park located on the east side of I-405. This area is characterized by dense, native deciduous and evergreen trees and offers hiking trails. The western boundary borders the I-405 right of way. An inside southbound travel lane will be constructed approximately 250 feet from this park. The park is buffered from I-405 by trees and distance, and there will be no change to the visual experience or acoustic conditions for hikers in the park.

Edith Moulton Park (2) is a 26-acre King County park located west of I-405. The park is largely undeveloped on its west, north, and east sides. This undeveloped area is characterized by dense, native deciduous and evergreen trees. A short portion of the east boundary is adjacent to the I-405 right of way. The remaining east boundary borders multi-family and single-family housing. An inside southbound travel lane will be constructed approximately 450 feet from this park. Because of distance, the developed area of the park—consisting of open lawn, picnic area, and picnic shelter—is well buffered from I-405, both visually and acoustically.

Spinney Homestead Park (3) is a developed 6.5-acre City of Kirkland park. Recreation facilities include a children's playground, pathways, open lawn area, as well as on-site parking. A large earth berm with dense deciduous and evergreen trees is located between the freeway shoulder and the park. This berm blocks the view to I-405 from the park. A southbound travel lane will be constructed approximately 125 feet from the park at its closest location. Some of the vegetation in the WSDOT right of way will be removed; however, the earth berm and many of the trees and shrubs will remain and continue to separate I-405 from the park. Traffic-generated noise will increase slightly, but not to a discernable level.

Watershed Park (4) is a 66-acre City of Kirkland park with an eastern boundary adjacent to the I-405 right of way. The park is largely undeveloped woodland that offers hiking trails. On the I-405 mainline, a southbound travel lane will be constructed approximately 65 feet from this park. Trees on the I-405 right of way will be removed during construction to make room for the added lane. However, construction will not affect trees in the park. The park is well vegetated; the hiking trails will continue to be screened visually from I-405. Traffic-generated noise will increase slightly, but not to a discernable level, and there will be no change to the visual experience for hikers within the park.

What is Section 6(f)?

Section 6(f) of the Land and Water Conservation Act (LWCFA) concerns transportation projects that propose impacts, or the permanent conversion, of outdoor recreation property that was acquired or developed with LWCFA grant assistance which in Washington is distributed by the Interagency Committee for Outdoor Recreation. The Act prohibits the conversion of property acquired or developed with these grants to a non-recreational purpose without the approval of the National Park Service.

What historic, cultural, and archaeological resources are located in the project area?

Through their archival research, project historians identified one above-ground historical resource within the project area.

The Shaw House, which appears to meet National Register of Historic Places (NRHP) eligibility Criterion A (for its association with economic growth during the early Twentieth Century) and Criterion C as an example of the Craftsman bungalow style.

A field survey also conducted as part of the Section 106 analysis revealed no additional buildings with physical integrity of historic significance.

Project archaeologists walked the project area and shovel tested landforms along the I-405 right of way. No buried archaeological resources were found; we do not expect to encounter them during construction.

What is Section 106?

Section 106 of the Historic Properties Act requires federal agencies to account for the effects of their undertakings on historic properties and to afford the Advisory Council on Historic Preservation an opportunity to comment. FHWA and WSDOT also seek to ensure that each tribe has the opportunity to identify and address any concerns regarding identification and evaluation of cultural resources and potential effects of the undertaking upon such resources.

Shaw House (eligible for the NRHP)

Will any historic, cultural, and archaeological resources be affected by the Kirkland Nickel Project?

The Shaw House is located sufficiently far from the site and is buffered by vegetation on local terrain so that it will not be affected by the project.

Though we do not expect to encounter archaeological resources during the project, WSDOT will prepare an Unanticipated Discovery Plan for the project that the contractor will be required to follow. This will avoid or minimize effects to historic, cultural, and archaeological resources.

Letters of concurrence regarding the area of potential effects and on the effects analysis from the Washington State Historic Preservation Office are included in Appendix D.

5.6 Public Services and Utilities

Public services and utilities are an important consideration during the planning and construction of transportation projects because they affect the quality of human life. They allow people to live in a safer environment and enjoy a higher standard of living. If these services were to be interrupted, discontinued, or altered, such unanticipated inconveniences or emergencies could affect work schedules, daily activities, and other routine activities.

City of Kirkland Fire Department in action

Please refer to the Kirkland Nickel Project Public Services and Utilities Discipline Report in Appendix O (on CD) for a complete discussion of public services and utilities analysis.

How were public services and utilities identified and analyzed for the Kirkland Nickel Project?

WSDOT evaluated the changes in travel times associated with construction and future operation of the project. This information was used to determine whether the project would affect response times of emergency vehicles, travel for school buses, and people accessing other public services, such as medical clinics.

WSDOT conducted a review of existing utility locations and compared them against the proposed project footprint. Any potential conflicts were noted and described by type and quantity. With this data, we determined where potential utility service disruptions and access problems might occur.

What public services and utilities are located in the project area?

Public services and utilities within the Kirkland Nickel Project area are provided by a mix of local, regional, public, and private entities. Locations of public services are presented in Exhibit 5-21 and listed below.

Police – The cities of Kirkland and Bothell, the King County Sheriff's Office, and the Washington State Patrol provide police protection to residents in this area.

Fire and Emergency Medical Services – Providers include the City of Kirkland Fire Department, the City of Bothell Fire Department, King County Fire District 41, and Woodinville Fire and Life Safety.

Exhibit 5-21
Public Services

School Districts – The Northshore and Lake Washington school districts provide public education in the project area, supplemented by private educational institutions.

Transit Services – King County Metro Transit, Community Transit, and Sound Transit provide regional and local bus service along I-405 through the project area, including service to park-and-ride facilities. Five park-and-rides directly serve the project area. Vanpool service is provided by King County Metro and Community Transit.

Healthcare Services – Six hospitals and health clinics serve the project area. Combined, their services range from emergency Level IV Trauma to mental health and chemical dependency treatment.

Utilities – Water, sewer, solid waste service, storm sewer, electric power, gas, fuel, phone, and cable telecommunications are provided within the area. These utilities are transmitted by both above- and below-ground lines.

How will public services and utilities be affected?

WSDOT determined that the Kirkland Nickel Project will have positive benefits to public services by improving response times for emergency vehicles. By adding a southbound lane, 10-20 percent more vehicles will be able to travel during the morning commute by 2014. The addition of the one northbound lane will also improve traffic flow during the early evening commute.

Overall, improved traffic flow will reduce response times for emergency vehicles, increase transit reliability, and make travel easier for individuals who use I-405 to get to public service provider locations.

Will any public services be displaced?

A park-and-ride lot located at the intersection of NE 116th Street and 120th Avenue NE will need to be removed. This park-and-ride lot, which has a current capacity for 24 vehicles, is located on WSDOT property. WSDOT has allowed temporary use of this property by King County Metro; the lot will not be replaced.

Will the project cause any utility disruptions?

The Kirkland Nickel Project will have temporary and minor effects on utilities; any probable utility conflicts will be resolved, typically by relocation of the utility prior to construction. Relocation will be at the expense of the utility operator. All known utilities in the project right of way operate under an agreement with WSDOT that allows for their relocation at the expense of the utility provider.

Utility relocation in the project area

Will construction activities affect the area?

How construction activities will affect neighbors and commuters is always a concern of WSDOT. However, effects on services are expected to be minor during construction of the Kirkland Nickel Project. Travelers through the area can expect minor delays; transit, school buses, and emergency response vehicles may also experience temporary route detours during some construction phases.

What measures are proposed to avoid or minimize effects to public services and utilities during construction?

WSDOT will coordinate several efforts with the contractor prior to and during construction of the project. These efforts will ensure that:

- The contractor will prepare and implement a traffic management plan (TMP). Signs will be posted to show detour routes if periods of closure are needed.
- Coordination with the school districts will occur before construction. The TMP will be implemented and coordinated with all emergency services providers prior to any construction activity.
- Coordination with utility service providers will identify conflicts and resolve them prior to or during construction.
- Prior to removal of the park-and-ride facility at NE 116th Street and 112th Avenue NE, signs will be posted at the lot to announce closure, and the location of nearby lots will be identified.
- Potential utility conflicts within WSDOT right of way will be relocated at the utility's expense prior to construction.

5.7 Visual Quality

When a person views the environment during an everyday commute or on a first-time trip to the city, the visual characteristics strongly influence responses—positive and negative. Research has shown that most people will generally agree on which views have high or low visual quality. This chapter describes how WSDOT studied the visual quality of the Kirkland Nickel Project area and examined how construction and operations will affect the views found within these local communities.

NE 160th Street southbound on-ramp

How were visual resources identified and evaluated for the project?

WSDOT conducted a visual impact assessment that evaluated both negative and positive visual effects of the project on the area's visual resources. These visual resources were identified based on a field reconnaissance of the I-405 Corridor, review of existing aerial photographs and review of proposed design plans for the project. The visual resources were evaluated using a subjective evaluation of three criteria: vividness, intactness, and unity. These "artistic" criteria are prominent in landscapes perceived as having high visual quality. Proposed project improvements were then incorporated into the views looking toward and from I-405 to determine visual quality after project construction. The visual effects were based on the degree of change between the existing visual quality and the visual.

Please refer to the Kirkland Nickel Project Visual Quality Discipline Report in Appendix P (on CD) for a complete discussion of visual qualityy analysis.

What are the visual resources located in the project area?

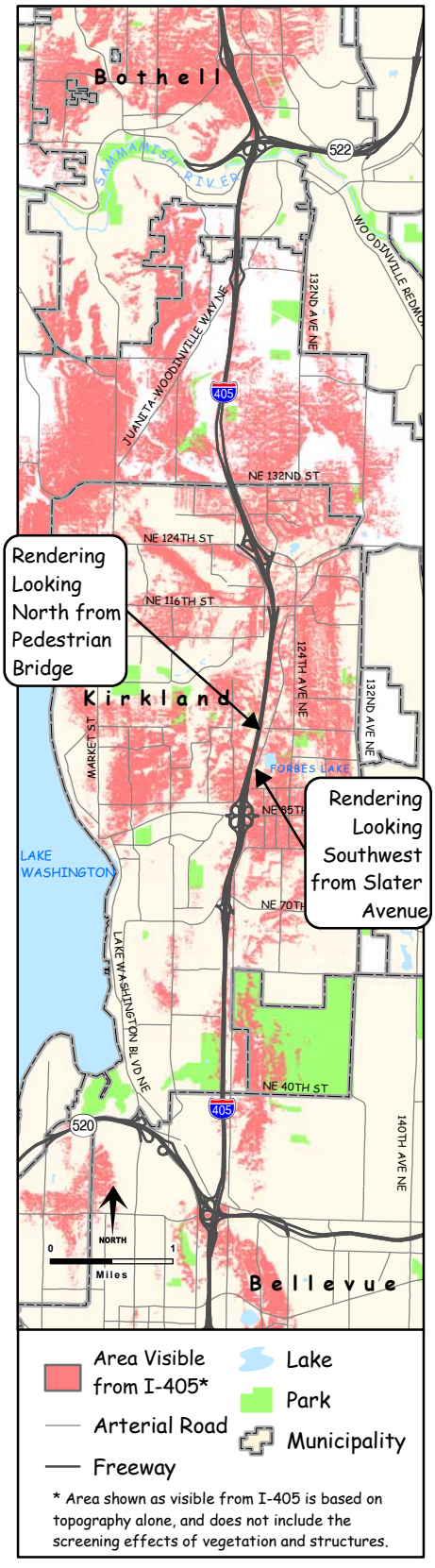
The Kirkland Nickel Project consists of an urban and suburban landscape with some roadside elements of natural vegetation providing isolated wooded landscape elements. Much of the right of way between interchanges has trees and other vegetation along the right of way. Generally, the land on either side of I-405 is developed as single-family residential neighborhoods interspersed with parks, schools, and churches. In many areas, houses and/or apartment buildings directly abut the I-405 right of way. The areas around the

How is visual quality determined?

The project team determined the visual quality of existing views using three criteria.

- Vividness is the memorability of landscape components as they combine in striking and distinctive visual patterns.
- Intactness is the visual integrity of the natural and human landscape and its freedom from encroaching elements.
- Unity is the visual coherence and compositional harmony of the landscape considered as a whole (FHWA, 1981).

Exhibit 5-22
Area Visible from I-405



interchanges are typically developed with a mix of commercial and light industrial land uses as well as multi-family residences.

The existing viewshed[1] is the area visible from I-405 (see Exhibit 5-22). Evaluators considered how the Kirkland Nickel Project will affect views looking from I-405 and toward I-405.

Currently, vegetation and structures screen many views looking both from and toward I-405. Vegetation along the right of way, particularly trees, provides an important visual screen between the roadway and adjacent lands. Visibility also decreases with distance. The freeway is visible from some locations near the roadway on cross streets, and there is greater visibility at the interchanges.

How will people be affected by visual changes as a result of the project?

Both roadway users and neighbors will experience changes in the visual resources in the vicinity of the I-405 and NE 116th Street interchange, which will be reconfigured and reconstructed. However, the widening of NE 116th Street and the reconfiguration of the interchange do not represent a substantial change to the existing landscape of commercial strip development and light industrial uses near the interchange.

I-405 users

Freeway users will experience minor changes in their visual environment as a result of the project. Exhibit 5-23 shows how the freeway will likely look to a freeway user at I-405 northbound at NE 100th Street. The effects on visual quality will include slight increases in urbanization and encroachment, e.g., additional pavement, traffic lanes, signs, and other transportation-related structures. Further, some of the existing roadside vegetation, including many medium to large trees, will be cleared for construction.

[1] The landscape that can be directly seen from a viewpoint or along a transportation corridor

The project includes provisions for maintaining the natural vegetation in areas where construction will not be occurring, and planting new vegetation to buffer constructed elements. Overall, the effect on freeway users will be low.

I-405 neighbors

The Kirkland Nickel Project will not affect the visual quality experienced by most I-405 neighbors. Roadway facilities are not visible from most of the surrounding neighborhoods; where they can be seen, a noise wall is usually the structure that is visible. Exhibit 5-24 shows how the freeway will look to neighbors on Slater Avenue NE where the noise wall will be moved to the edge of the right of way. Overall, few neighbors will experience noticeable changes in the visual environment.

How will project construction activities affect views?

Removing vegetation will create temporary effects on I-405 users and neighbors during construction, increasing visibility looking toward and away from the freeway. In addition, the necessary construction equipment, barricades, lights, and signs will add complexity to what freeway users and some neighbors will see.

What measures are proposed to avoid or minimize effects to visual quality during construction?

- The contractor will follow the I-405 Context Sensitive Solutions (CSS) criteria being developed. Where local terrain and placement of light poles allow, the contractor will reduce light and glare effects by shielding roadway lighting and using downcast lighting so light sources will not be directly visible from residential areas and local streets.
- The contractor will restore (revegetate) construction areas in phases rather than waiting for the entire project to be completed.

Exhibit 5-23
I-405 at NE 100th Street, looking north from pedestrian bridge

Before

After

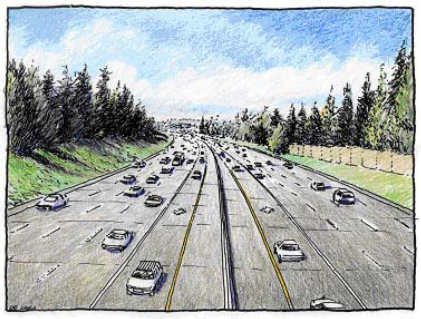
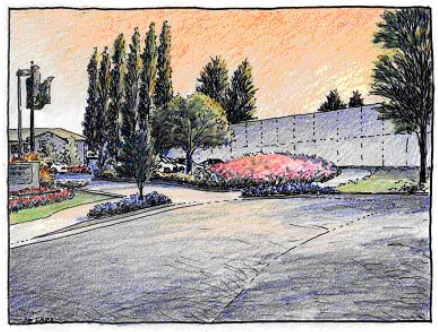


Exhibit 5-24
Looking southwest from Slater Avenue NE

Before

After



5.8 Air Quality

Clean air is important to a community's wellbeing and the environment. Pollutants in the air can have negative effects on human health and cause harm to animals, plants, and materials. Emissions from cars, trucks, and buses are a major factor affecting air quality, particularly in urban areas. Maintaining good air quality will be important to freeway users, neighbors, and the community at large.

Heavy traffic on I-405

Please refer to the Kirkland Nickel Project Air Quality Discipline Report in Appendix Q (on CD) for a complete discussion of the air quality analysis.

Is air quality a concern in the project area?

Because of heavy traffic congestion in the project area, there are several air pollutants associated with vehicle emissions. These pollutants include oxides of nitrogen (NO_x), carbon monoxide (CO), particulate matter (PM_{10}) [1], ozone, hazardous air pollutants, and greenhouse gases, primarily carbon dioxide (CO_2). CO is a colorless, odorless, and poisonous gas generated by automobiles that reduces the oxygen-carrying capability of the blood. Nitrogen oxides (NO_x) and hydrocarbons contribute to the ozone formation on a regional scale. Ozone, also referred to as smog, is an irritant, reduces lung function, and can damage plants and materials. PM_{10} refers to particles less than 10 micrometers in size; it includes small dust particles and diesel particulate. The small particles can be inhaled deeply into the lungs, potentially leading to respiratory diseases. PM_{10} is an important concern during construction.

How was air quality evaluated for the project?

Air pollution is treated as a regional issue; however, some pollutants, such as CO, can have localized areas of high concentrations or "hot spots" under stable atmospheric conditions.

Regionally, the Kirkland Nickel Project was evaluated as part of the I-405 Corridor Program by the Puget Sound Regional Council. Air quality modeling results show that the Puget Sound Region, including the I-405 Corridor Program improvements, will conform to the Clean Air Act.

What is the Clean Air Act?

The Clean Air Act of 1970, 42 USC 7401 et seq., was enacted to protect and enhance air quality and to assist state and local governments with air pollution prevention programs. Under the Clean Air Act Amendments of 1990, USDOT cannot fund, authorize, or approve federal actions to support programs or projects that are not first found to conform to Clean Air Act requirements.

[1] Any liquid or solid particles present in the atmosphere.

What are air quality standards?

Under the federal Clean Air Act, the US Environmental Protection Agency (EPA) has set National Ambient Air Quality Standards (NAAQS) that specify maximum concentrations for specific pollutants. Transportation projects must conform to the NAAQS by demonstrating that:

- the proposed project will not cause or contribute to any new violation of NAAQS;
- the project will not increase the frequency or severity of any existing violation of any NAAQS; and
- the project will not delay timely attainment of the NAAQS within the region.
- It will not increase a CO reading in the design year (2030) over the CO reading in the existing year.

In addition to federal requirements, the Kirkland Nickel Project must conform to Air Quality Maintenance Plans (AQMPs) for ozone and CO that have been established for the Puget Sound region.

WSDOT evaluated how the Kirkland Nickel Project will affect regional air quality characteristics such as greenhouse gas emissions and ozone formation, as well as particulate matter.

Two future years were evaluated, 2014 and 2030. The year 2014 was analyzed to determine the project's effects on air quality in the year when the entire Kirkland Nickel Project is anticipated to be completed. The year 2030 was also evaluated to show the project's long-term effects.

How will air quality change with the project?

Based on the results of modeling, WSDOT has concluded that there will be no substantial air quality effects from CO concentrations as a result of the Kirkland Nickel Project.

WSDOT studied air quality at the four intersections with the highest traffic volumes and the most congestion (Exhibit 5-25). We used these intersections to model worst-case CO levels under existing conditions, as well as future conditions projected for both the proposed Build and the No Build alternatives. The modeled results represent the worst anticipated atmospheric conditions of cold, stable air, and peak-period traffic.

Because more traffic will move through some intersections with the project, the worst-case CO concentrations will be slightly higher at some locations with the project than without; however, none of the predicted future concentrations will exceed the NAAQS for CO; therefore, the project will not have a substantial negative effect on localized CO levels (Exhibits 5-26 and 5-27).

How will construction activities affect air quality?

Construction activities typical of roadway projects will temporarily generate particulate matter (mostly dust) and small amounts of other pollutants.

Emissions during construction activities will be temporary, limited to the immediate area surrounding the construction site, and will contribute only a small amount to the total emissions in the project area.

Exhibit 5-25
Intersections Studied for Air Quality

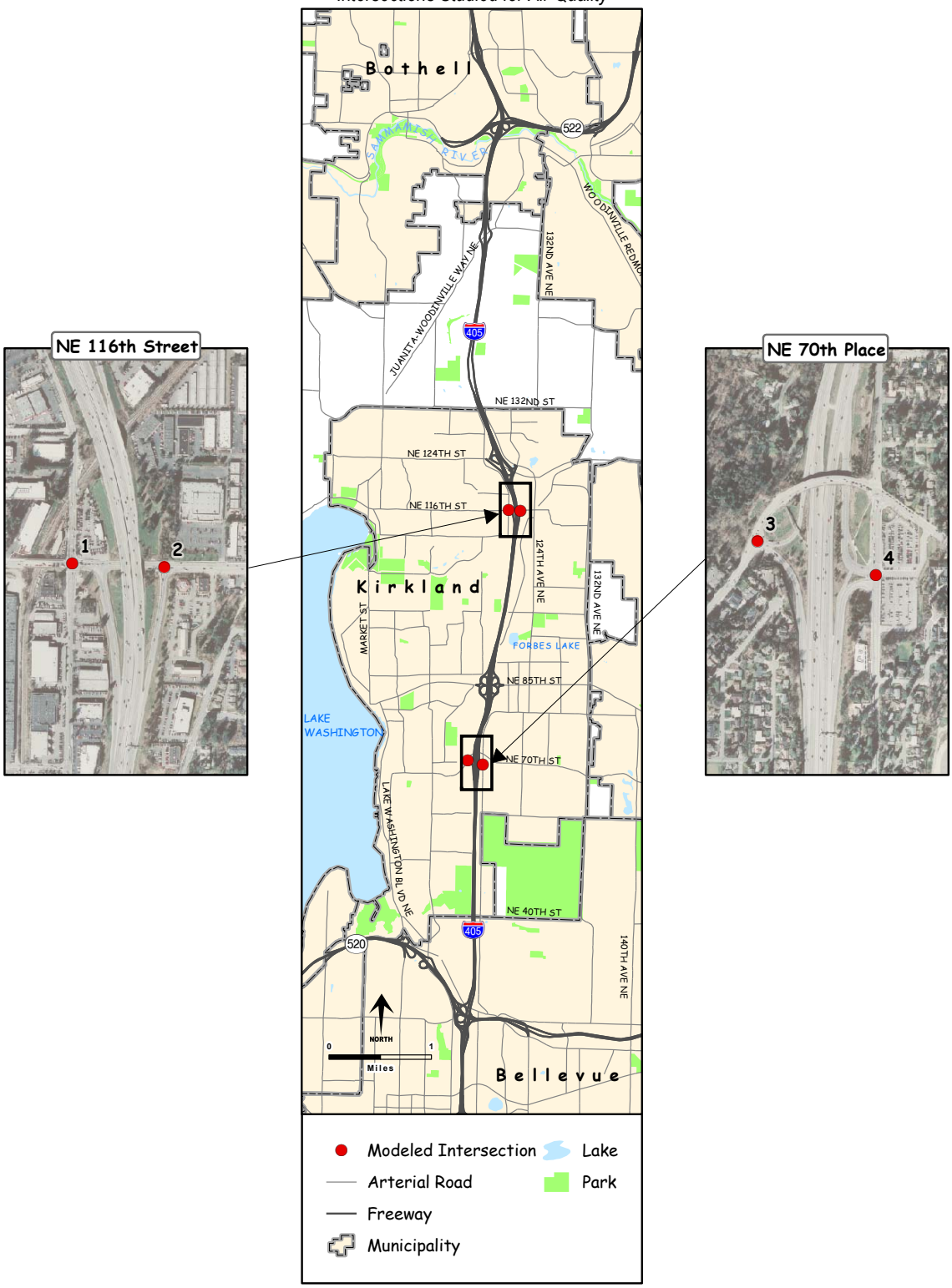


Exhibit 5-26

One-hour Average CO Concentrations

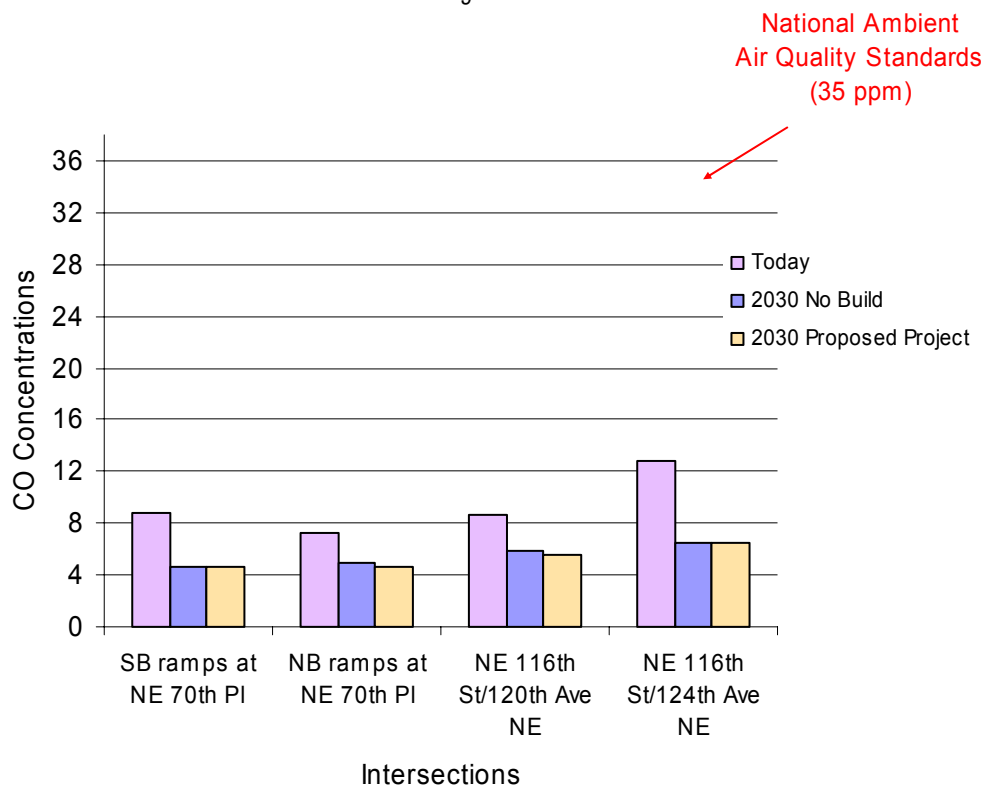
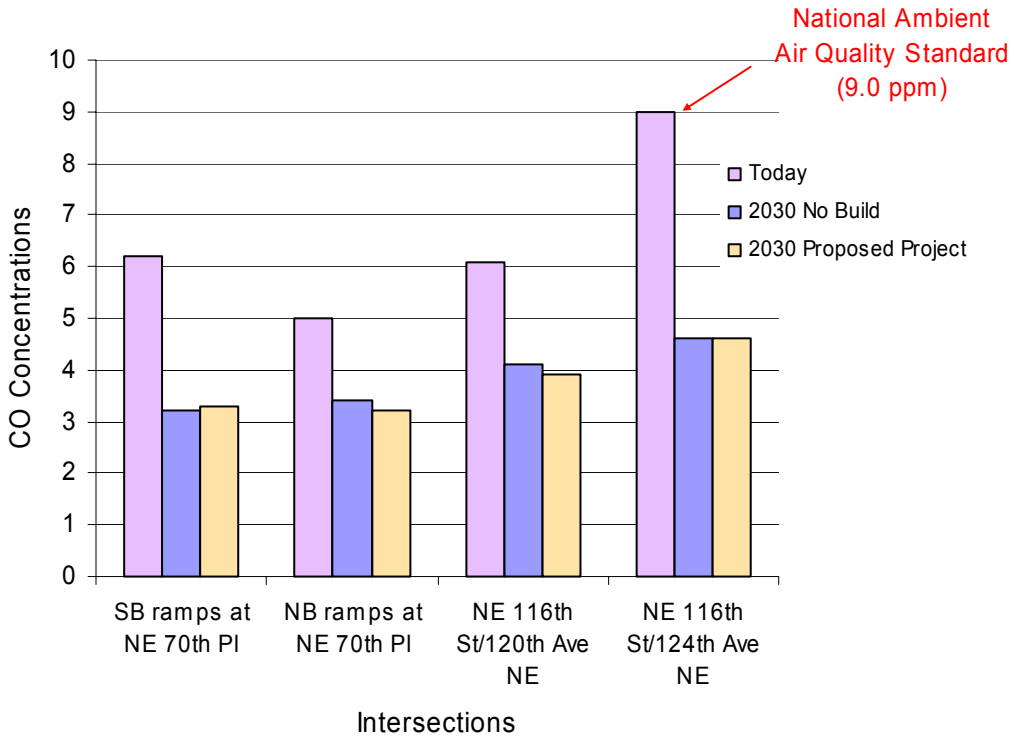


Exhibit 5-27

Eight-hour Average CO Concentrations



What measures are proposed to avoid or minimize effects to air quality during construction?

Measures to reduce air quality emissions during construction were discussed in the *I-405 Corridor EIS*. The measures applicable to the Kirkland Nickel Project are summarized here.

Fugitive dust will be controlled by the contractor in accordance with the Memorandum of Agreement between WSDOT and PSCAA Regarding Control of Fugitive Dust from Construction Projects (October 1999).

The following measures will be used to control dust (PM_{10}), transmission of particulate matter, and emissions of CO and NO_x during construction:

- Exposed soil will be sprayed with water to reduce emissions of PM_{10} and deposition of particulate matter.
- All truck loads will be covered, and materials in trucks will be wetted or providing adequate freeboard (space from the top of the material to the top of the truck) to reduce PM_{10} and deposition of particulates during transport.
- Wheel washers will be provided to remove particulate matter that would otherwise be carried off site by vehicles to decrease deposition of particulate matter on area roadways.
- Particulate matter deposited on public roads will be removed to reduce mud on area roadways.
- Dirt, gravel, and debris piles will be covered or wetted during periods of high wind when the stockpiles are not in use.
- Construction trucks will be routed and scheduled to reduce travel delays and unnecessary fuel consumption.

5.9 Water Resources

Water resources are essential to maintaining human health, fish and wildlife habitat, and vegetation. These resources can be affected by roadway projects because increased impervious surfaces can lead to changes in hydrology, degrade the surface waters that drain to streams and, thereby, affect natural habitats. These changes can also influence flooding effects and groundwater recharge[1].

The Kirkland Nickel Project will benefit local water quality and baseline hydrology by treating almost three times as much impervious surface as the project will create.

Please refer to the Kirkland Nickel Project Water Quality, Surface Water and Floodplains, and the Geology, Soils. And Groundwater discipline reports in Appendices R, S, and T, respectively, (on CD) for a complete discussion of water resources analyses.

How were water resources evaluated for the project?

To identify water resources within the Kirkland Nickel Project area, WSDOT scientists and staff reviewed numerous maps and plans, GIS databases, aerial photographs, water quality studies, databases on point sources (such as pipes, ditches, channels, and wells), agency Web pages, and other recent data.

What water resources are found in the project area?

Natural water resources typically include surface water (also in the form of stormwater), floodplains, lakes, wetlands, and groundwater. Within the Kirkland Nickel Project area, a wide range of these resources exists.

Surface Water

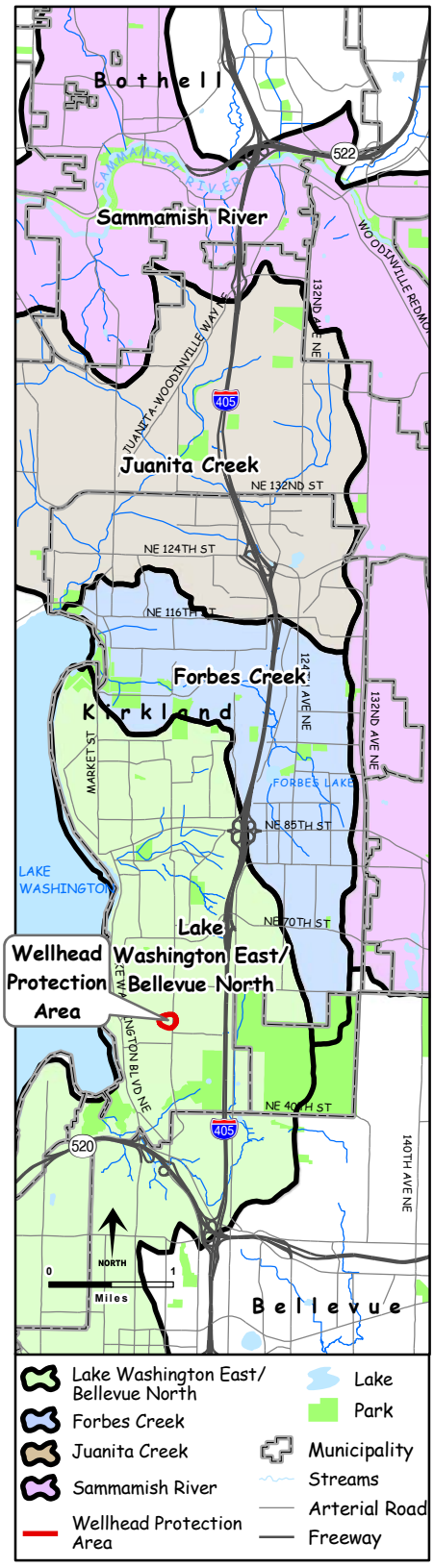
Surface waters are waters stored or flowing at the earth's surface including natural bodies of water (rivers, lakes, and wetlands), as well as water in human-made storage and conveyance facilities (lakes, detention ponds, and piped drainage systems). Discharges to these waters are regulated by the Clean Water Act. Effects to surface waters can occur when pervious (permeable) areas are converted to impervious (hard, impermeable) surfaces such as pavement. When

What is the Clean Water Act?

The Water Pollution Control Act, better known as the Clean Water Act, 33 USC 1251 et seq., provides for comprehensive federal regulation of all sources of water pollution. It prohibits the discharge of pollutants from non-permitted sources. In Washington, authority to administer the Clean Water Act is delegated primarily to the US Army Corps of Engineers and the Department of Ecology.

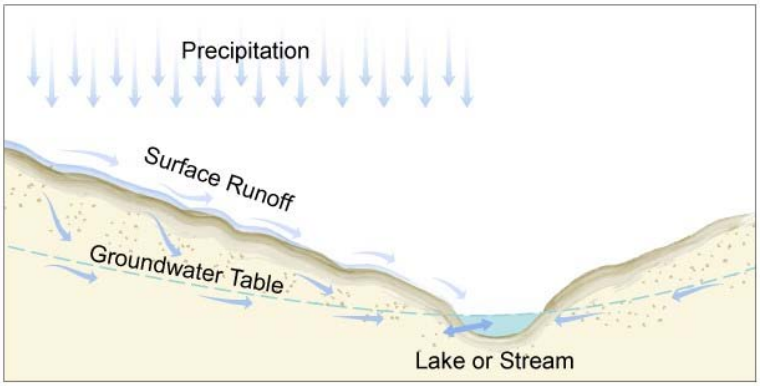
[1] The infiltration of water into the earth. Groundwater recharge may increase the total amount of water stored underground or only replenish supplies depleted through pumping or natural discharge.

Exhibit 5-29
Watersheds and Associated Streams



surface water, sometimes in the form of stormwater, cannot be absorbed by the ground, runoff occurs and volumes increase. Changes in runoff volumes and velocities can cause stream bank erosion, streambed scouring, and increased flooding risks (Exhibit 5-28).

Exhibit 5-28: How does water move across and below the ground?



The Kirkland Nickel Project area includes four watersheds[2]: Lake Washington East/Bellevue North, Forbes Creek, Juanita Creek, and the Sammamish River. The main receiving surface waters include Yarrow, Forbes, and Juanita Creeks, the Sammamish River, and Lake Washington.

Additional small tributaries that contribute to the Sammamish River and Lake Washington, and drainages that cross or run parallel to I-405 and receive runoff from the Kirkland Nickel Project area are also part of the project's affected environment. Exhibit 5-29 shows the area's watersheds and their associated rivers, streams, and waterbodies.

Floodplains

There are no 100-year floodplains in the Kirkland Nickel Project area that have been designated as Areas of Special Flood Hazard by the Federal Emergency Management Agency. With the exception of limited work in Forbes and Juanita creeks, the proposed project will not encroach on any existing floodplains; furthermore, it will not substantially change downstream floodplains or flooding characteristics.

[2] A geographic region within which water drains into a particular river, stream, or body of water.

Groundwater

The Group-A Groundwater Supply Well System, referred to as the Kirkland Well Field, is located about 3,000 feet west and down-gradient of I-405 between MP 16.5 and MP 16.6 (Exhibit 5-29). This system is operated by King County Water District No. 1 as a public water supply. These wells provide domestic water to approximately 200 Yarrow Point residences.

Based on studies conducted by King County, groundwater travel time from I-405 to the Kirkland Well Field is about five years. The Kirkland Nickel Project will avoid impacts to this water supply by piping stormwater discharged from I-405 around the recharge area for the well field..

According to the Washington Department of Health, the use of the Kirkland Well Field may be discontinued in the near future. A request to obtain potable water from Bellevue has been made for the Yarrow Point community (Washington Department of Health, 2004). The date for transferring service and future use of the Kirkland Well Field is unknown at this time.

A culvert that crosses under the I-405 northbound lanes

How is stormwater from I-405 currently managed?

The project has been designed to comply with WSDOT's *Highway Runoff Manual* (2004) and *Hydraulics Manual* (2004). Best Management Practices from the *Highway Runoff Manual* have been incorporated into the design.

The I-405 roadway within the Kirkland Nickel Project area has about 263 acres of impervious surfaces. Currently, the stormwater runoff drains to nearby streams or municipal storm drainage systems, and, ultimately to Lake Washington. Cross-culverts along the project corridor convey upstream (off-site) runoff from the east, and some roadway (on-site) runoff to urban creeks, the Sammamish River, and small watercourses and urban storm drains.

How will stormwater be affected once the project is built?

The proposed project will include enhanced water quality treatment facilities consisting of ecology embankments[3] and a combination of stormwater treatment wetlands/detention

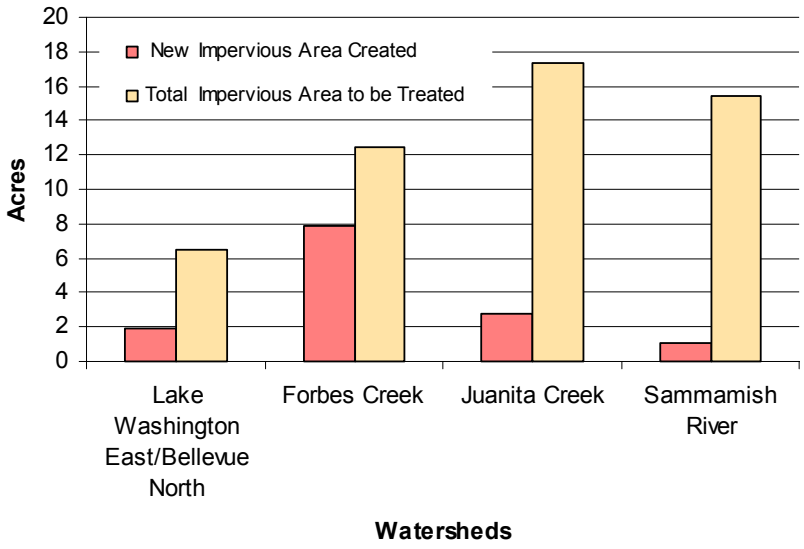
What is enhanced water quality treatment?

Enhanced water quality treatment is the use of best management practices to capture dissolved metals. The performance goal for enhanced treatment is 50-percent removal of certain metals.

[3] A stormwater treatment facility constructed in the pervious shoulder area of a highway, consisting of a vegetation-covered french drain containing filter media (see Exhibit 4-7).

ponds. These facilities will provide enhanced treatment for the proposed 13.56 acres of new impervious surfaces, and 38.17 acres (approximately 14.5 percent of existing impervious surfaces within this portion of I-405) of presently untreated impervious surfaces (Exhibit 5-30).

Exhibit 5-30
Stormwater Treatment



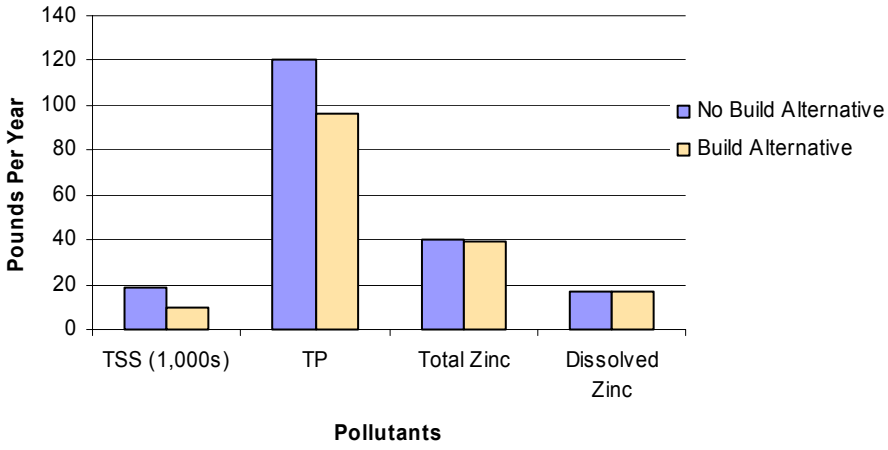
Four pollutants (suspended solids, zinc, dissolved zinc, and phosphorous) are important because there is sufficient data on these constituents to estimate runoff based on average daily traffic loads. Elevated levels of suspended solids are a concern because turbid water can directly impair aquatic life. Suspended solids can also indirectly degrade downstream receiving waters because many other pollutants can absorb onto the particles.

Total and dissolved zinc are important because they represent heavy metals impacts. Phosphorus is evaluated because of its potential to increase eutrophication of streams and lakes. Other pollutants in highway runoff can also be a concern, depending on the receiving waters and the relative amount of pollutant loading. In-stream temperatures are another water quality concern in the project area. In-stream temperatures above water quality standards are functions of ambient air temperature, surface area, stream volume, and shaded riparian cover. Stormwater runoff is generally a minor consideration, since the vast majority of runoff events do not

occur in summer or early fall when stream temperatures tend to be elevated. The other pollutant of concern for streams in the project area is fecal coliform, which is typically not associated with highway runoff.

Overall, the proposed project will improve water quality with a net decrease in the annual pollutant loading of total suspended solids (TSS), total phosphorus (TP), and zinc. Most notably, the proposed treatment will reduce annual pollutant loading to the main receiving water, Lake Washington (Exhibit 5-31).

Exhibit 5-31
Pollutant Loadings



Stormwater Detention

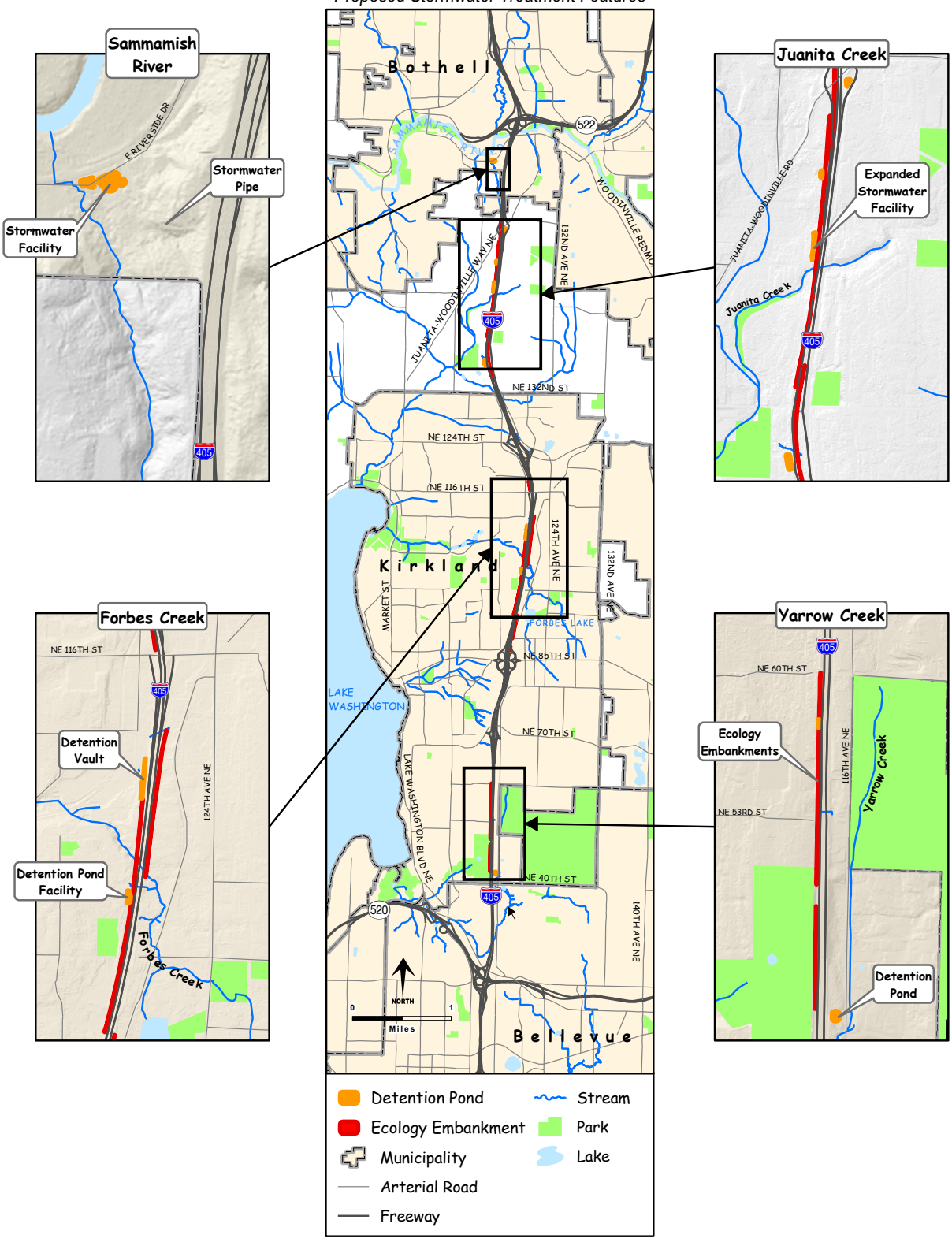
Stormwater detention systems for half of the two-year through 50-year storm events will be incorporated into the project, as required. The proposed permanent drainage improvements will collect and treat runoff prior to release into municipal storm drains or the following downstream waterbodies, including:

- Yarrow Creek – a detention pond along the east side of the corridor (approximately MP 15.9) will discharge waters through a swale that leads to Yarrow Creek (Exhibit 5-32). Enhanced water quality treatment will be provided by ecology embankments along the west side of I-405 adjacent to the new pavement areas.
- Forbes Creek – The Forbes Creek watershed will receive treatment for flow control by a detention pond

and a large detention vault on the west side of the freeway (approximately MP 19.1). The detention pond will discharge runoff to the existing ditch leading to the Forbes Creek ravine. An additional detention vault will be constructed at approximately MP 19.4. This vault will replace an existing small detention pond. Discharge will continue to the Forbes Creek tributary.

- Juanita Creek – The I-405 project will re-route a portion of the stormwater from the west side of the freeway that discharges into a tributary to Juanita Creek. Re-routing of this flow to an expanded detention pond will provide relief to existing culvert capacity.
- Sammamish River – There is a steep and deeply-incised ravine within the Sammamish Watershed that has been identified as a landslide, erosion, and seismic hazard area. Drainage improvements for this area will re-route high storm flows around the ravine, but not change the overall drainage pattern. Freeway runoff and off-site runoff will be separated and routed independently to the Sammamish River. Off-site runoff will be distributed to three separate existing outfalls to the Sammamish River by the use of flow splitters. On-site runoff will be routed to a detention pond at the bottom of the ravine, and then flow through an existing roadside ditch to an open channel to the Sammamish River.

Exhibit 5-32
Proposed Stormwater Treatment Features



How will construction activities affect water resources in the project area?

Construction activities are expected to include the building of new culverts, detention facilities, stream crossings, new storm drain systems, enhanced water quality treatment facilities, and paving. These activities will affect water quality and water quantity as described below.

Construction effects to water quality

Project construction may have minor effects on water quality of the small tributaries; however, the effects will be temporary. No long-term adverse effects on receiving streams or Lake Washington are anticipated.

The contractor will be required to prepare a temporary erosion and sedimentation control (TESC) plan and a spill prevention control and countermeasures (SPCC) plan prior to initiating construction. Implementing these plans will minimize erosion effects, decrease the sediments entering receiving waters from the construction area, and protect against effects from harmful material spills to streams.

Automotive-related substances, such as petroleum hydrocarbons and heavy metals, are another concern during construction. These substances may be found in staging areas, on temporary roads, or on other work surfaces such as the freeway. If discharged directly to surface waters, these contaminants can reach concentrations that are toxic to aquatic life. The SPCC plan will specify that equipment fueling and maintenance and storage of fuels and toxic materials can only take place away from surface waters.

Construction effects to water quantity

There will be increased amounts of runoff during construction. Detention provided during construction will help prevent downstream flooding, erosion, and sedimentation. The increased runoff will not have any appreciable effect on Lake Washington because of the lake's large size and volume in comparison to the small amount of runoff from the freeway. Other waterbodies that convey water to Lake Washington will each receive a small amount of flow from the construction areas. Each waterbody should have sufficient capacity to convey the flow without increasing flood risk.

What measures are proposed to avoid or minimize effects to water resources during construction?

Several measures will be incorporated into construction plans and specifications to reduce effects to water resources.

Groundwater

- Groundwater will be protected with the use of standard best management practices (BMPs).
- A TESC plan and a SPCC plan will be prepared and implemented.
- The contractor will be required to take added measures during construction within the Kirkland Well Field's Wellhead Protection Area to protect the area, such as prohibition of fuel and chemical storage and refueling operations. Also, construction specifications will require stormwater collection with either a lined or piped conveyance system within the Wellhead Protection Area. Stormwater will be directed and discharged outside of the Kirkland Wellhead Protection Area to prevent any possible degradation of water quality. No permanent stormwater facilities will be constructed in the Kirkland Wellhead Protection Area.
- The contractor will identify and develop staging areas for equipment repair and maintenance away from all drainage courses. Washout from concrete trucks will not be dumped into storm drains or onto soil or pavement that carries stormwater runoff. Thinners and solvents will not be used to wash oil, grease, or similar substances from heavy machinery or machine parts. The contractor will be required to designate a washdown area for equipment and concrete trucks.
- Prior to construction, a National Pollutant Discharge Elimination System (NPDES) Stormwater Construction Permit covering activity in the highway right of way will be obtained from the Washington State Department of Ecology.
- WSDOT will obtain a Hydraulic Project Approval (HPA) from the Washington Department of Fish and Wildlife (WDFW) prior to construction. The HPA will address impacts from water quality and quantity.

What are best management practices?

Best management practices (BMPs) are actions or structures that reduce or prevent pollutants from entering stormwater and degrading water quality. There are many different types of BMPs – some are treatment technologies, such as stormwater treatment ponds. Others are typical measures that can be implemented as part of a project, such as sweeping streets to eliminate debris. Some BMPs are permanent features of a project, others can be temporary measures used during construction.

- For work within waters of the United States (such as stream crossings) WSDOT will obtain a Section 404 permit from the US Army Corps of Engineers.

What measures are proposed to avoid or minimize effects to water resources during operation?

Groundwater

- The SPCC plan will address the project's long-term operational phases. Permanent stormwater collection, conveyance, and discharge systems will capture and control spills and prevent contamination of the groundwater aquifers.

Water Quality

- Permanent controls for the mitigation or containment of spills will be provided for new pavement (or equivalent pavement areas) within the project area. Stormwater treatment facilities for flow control and water quality runoff treatment will provide successive levels of protection for downstream conveyance systems by intercepting and retaining spilled contaminants. Subsequent maintenance activities would remove the contaminants from the treatment facilities and restore normal operation to the system.
- Scheduled maintenance programs developed for the stormwater treatment system will include provisions for the regular removal of contaminants and restoration of treatment operations.
- Oil and other petroleum products will be removed with oil treatment facilities.

5.10 Wetlands

Wetlands are a valuable resource to our environment. They can help moderate stormwater flows by slowing down and retaining flood waters during periods of rain. They can help reduce flooding downstream and clean the water of material such as dirt and oil. Wetlands may also provide vital habitat for many plants and animals.

Roadside wetland along I-405

How were wetlands identified in the project area?

WSDOT biologists conducted literature reviews and field investigations using methods defined by the Washington State Wetlands Identification and Delineation Manual (Ecology, 1997) to determine wetland boundaries and characteristics. This method is in agreement with the US Army Corps of Engineers' method (1987).

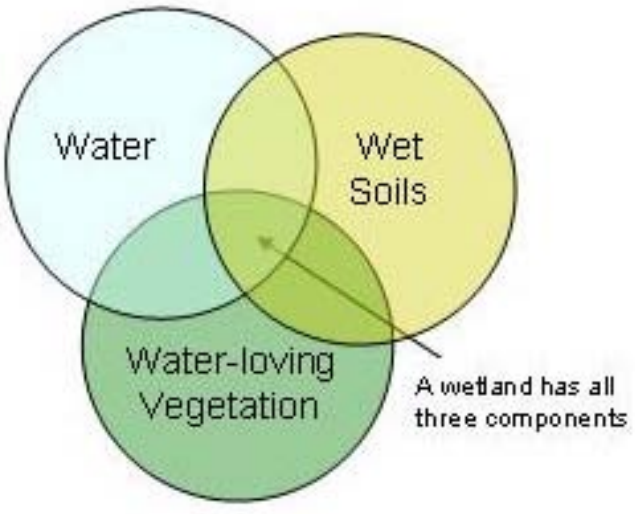
Wetlands are made up of three components, as shown in Exhibit 5-33, and categorized according to their quality.

Are wetlands located in the project area?

There are several wetlands located in the project area. Exhibit 5-34 shows these sites along the Kirkland section of I-405, together with map insets that indicate the wetlands that will be affected by the project.

Please refer to the Kirkland Nickel Project Wetlands Discipline Report in Appendix U (on CD) for a complete discussion of wetlands analysis.

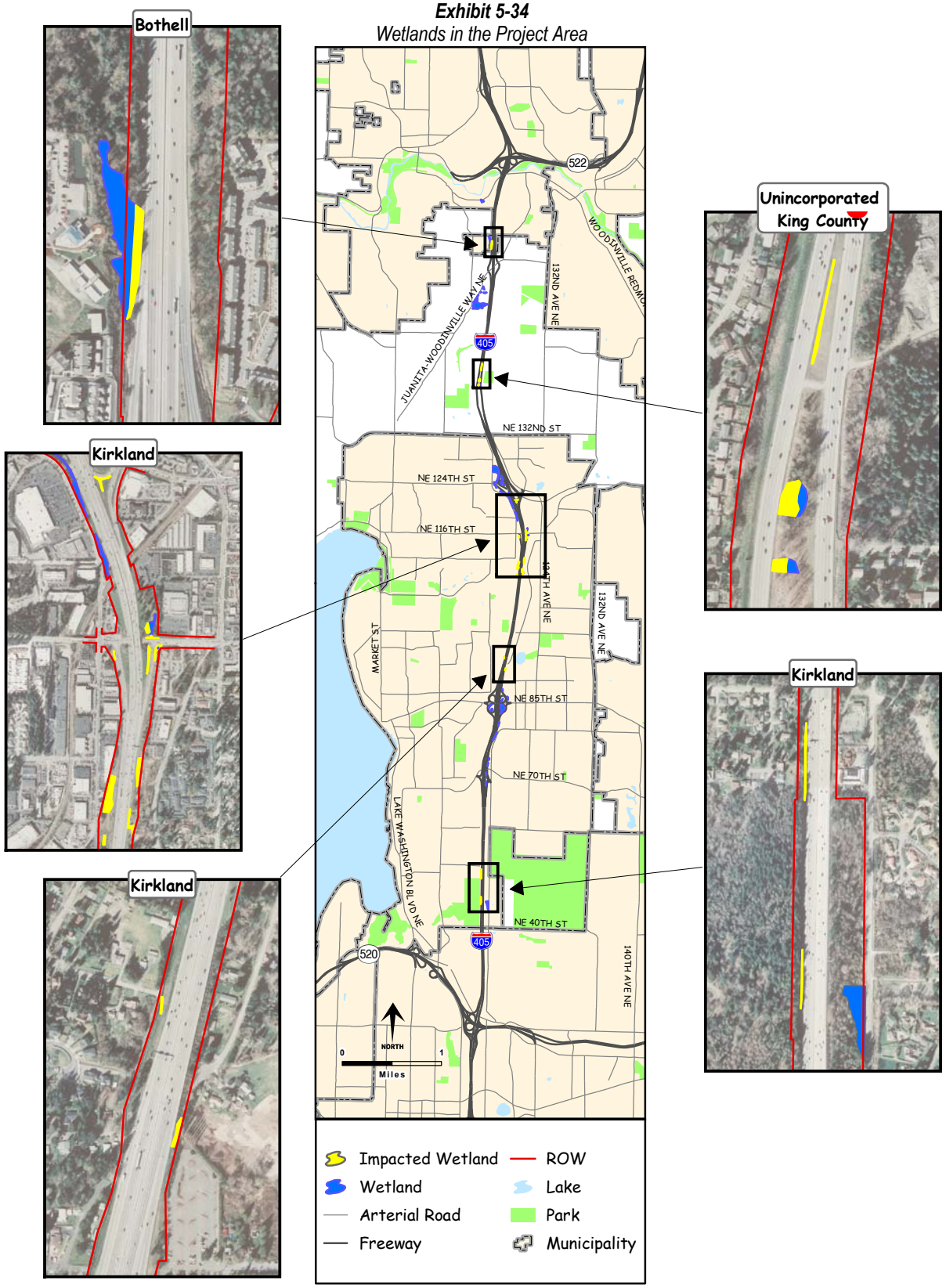
Exhibit 5-33: Components of a Wetland



How are wetlands categorized?

Wetlands are categorized according to their size, vegetation and benefit to society. Lower quality wetlands are generally small, lack trees and shrubs, and have been disturbed by past development. Medium-quality wetlands contain some younger trees and shrubs; and high quality wetlands contain primarily mature trees and bushes and are used by a lot of animals.

Exhibit 5-34
Wetlands in the Project Area



How will wetlands be affected by the project?

The Kirkland Nickel Project will affect wetland areas along both sides of I-405, primarily within the WSDOT right of way. Two additional locations, where the project extends into privately-owned property, will be affected by stormwater detention, interchange improvements, or roadway widening where wetlands are present.

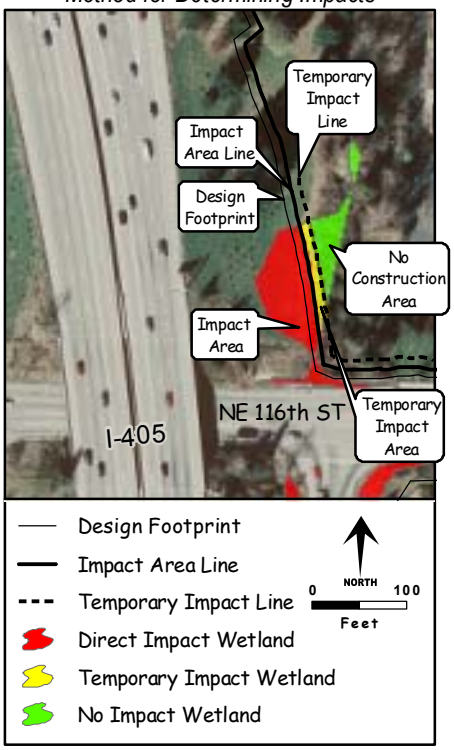
The project team compared wetland survey data files with project engineering data. The project footprint was then overlain onto the wetland survey data to determine the number and extent of affected wetlands. Exhibit 5-35 illustrates the method for determining impacts. Construction of the Kirkland Nickel Project will affect wetlands regulated by King County, and the cities of Bothell and Kirkland.

Because of a long history of disturbance from past roadway construction and other development, wetland quality in the I-405 Corridor is generally poor. Thirteen of the 14 affected wetlands in the Kirkland Nickel Project area can be characterized as lower-quality wetlands, typically associated with ditches alongside the road. The remaining wetlands can be characterized as medium quality, which provide minimal water quality improvement and habitat value. Exhibits 5-36 and 5-37 are examples of these types of wetlands. The larger medium- or high-quality wetlands, which provide valuable habitat functions, are usually more natural and occur outside the WSDOT right of way and will not be affected.

When the I-405 roadway is widened, wetlands totaling 1.6 acres will be permanently filled. The majority of these wetlands are located adjacent to the roadway in the form of ditches or stormwater detention facilities.

Wetlands occur in areas along I-405 that have been modified by creating ditches and re-grading the soil to control stormwater. Water from these wetlands typically flows into culverts that extend beneath I-405 or adjacent roads, or into storm drains.

Exhibit 5-35
Method for Determining Impacts



Design Footprint
Cut and fill line or design limit

Impact Area Line
10' offset of design footprint - limit of construction

Temporary Impact Line
10' offset of impact area line - occurs only along environmentally sensitive areas.

Impact Area
Area between existing roadway and design footprint. Construction may occur up to the Impact Area Line.

Temporary Impact Area
Area between impact line and temporary impact line - This area may be cleared for construction, but will be restored to pre-project conditions.

No Construction Area
Construction is prohibited.

Exhibit 5-36
Seep Wetland

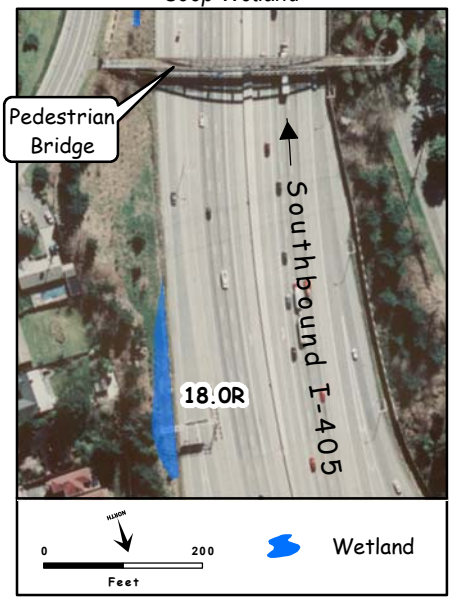
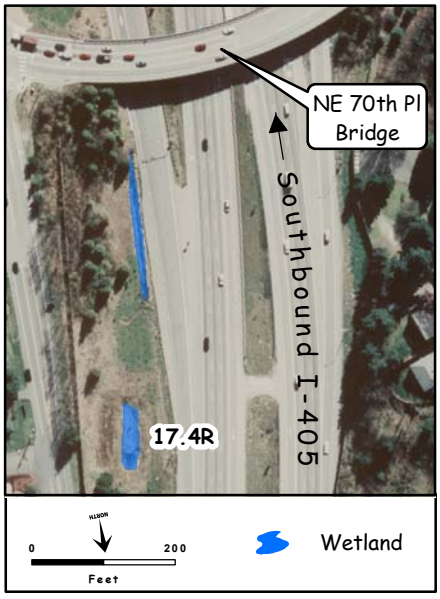
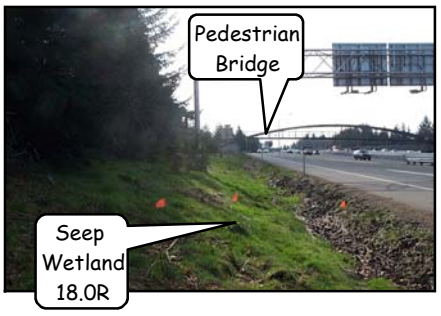
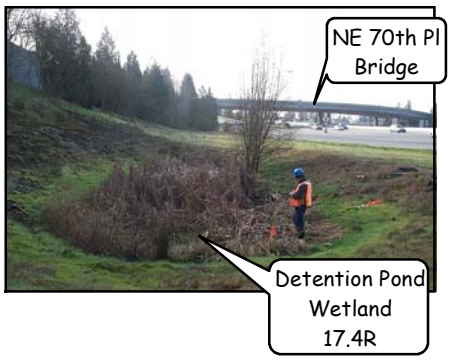


Exhibit 5-37
Detention Pond Wetland







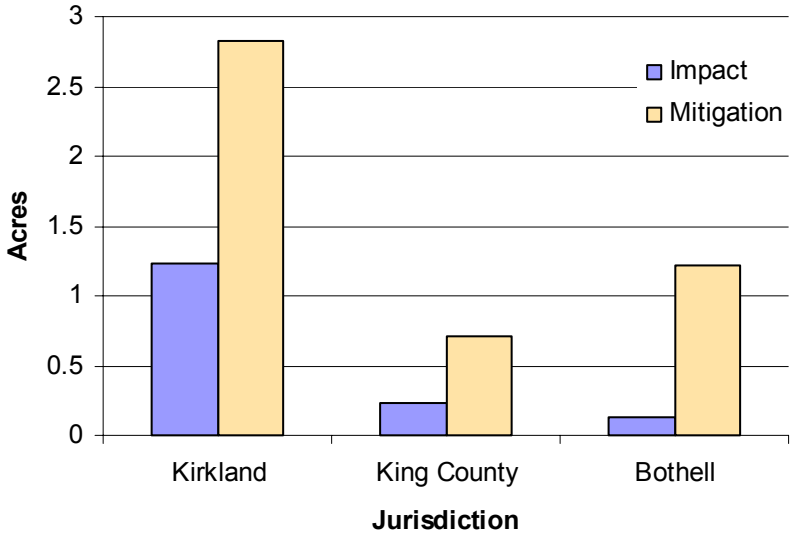
Because the affected wetlands will occur in three separate jurisdictions, each jurisdiction will use its specific guidance to determine how the effects to wetlands will be addressed. Exhibits 5-38 and 5-39 compare the extent of wetland effects, and show proposed mitigation for each jurisdiction.

Exhibit 5-38: Wetland Impacts and Proposed Mitigation

Local Jurisdiction	Number of Affected Wetlands	Acres of Temporary Impacts	Acres of Permanent Impacts	Acres of Mitigation
City of Bothell	1	0.099	0.136	1.220
City of Kirkland	10	0.050	1.229	2.828
King County	3	0.031	0.235	0.704
Total	14	0.180	1.600	4.752

Exhibit 5-39

Permanent Wetland Impacts and Proposed Mitigation



How will construction activities affect wetlands?

Most construction effects are temporary. However, temporary effects can result in a short-term loss of wetland functions during construction and for up to five years following construction. WSDOT does not expect these effects to result in a complete loss of wetlands once the project is completed and disturbed vegetation or wetland hydrology is reestablished.

WSDOT anticipates that the equipment will need 10 feet beyond the grading limits during construction for space to turn and move about. Within this space, machinery may disturb wetlands and possibly cause dirt to mix with excess water from the project and spill into the wetlands. Such conditions can degrade wetland functions.

What measures are proposed to avoid or minimize effects to wetlands during construction?

The following activities will be undertaken to avoid or minimize effects to wetlands:

- WSDOT and the contractor will protect, preserve, and enhance the wetlands in the project area during the planning, construction, and operation of transportation facilities and projects consistent with USDOT Order

5660.1A; Executive Order 11990 and Governor's Executive Orders EO 89-10 and EO 90-04.

- The project will follow guidance contained in the WSDOT *Environmental Procedures Manual* (WSDOT, 2004a), which outlines the issues and actions to be addressed prior to authorizing work that could affect wetlands.
- The contractor will use fencing to clearly mark wetlands to be avoided in the construction area.
- Project-level design and environmental review has included avoidance, minimization, restoration, and compensation of wetlands. The contractor will implement these measures to reduce temporal losses of wetland functions.

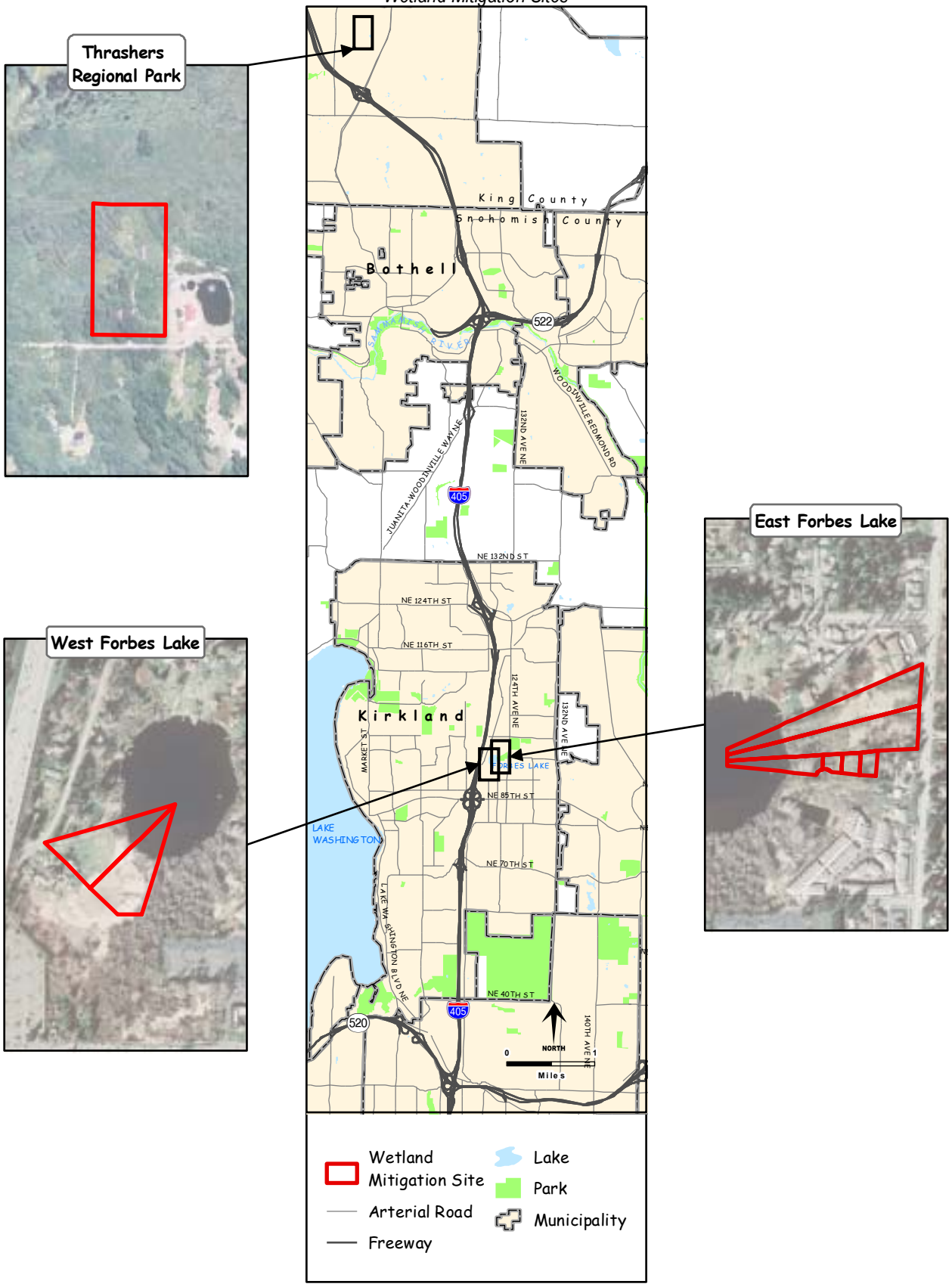
The Kirkland Nickel Project mitigation strategy includes the use of guidance by local governments to select projects that provide substantially greater functions and values than the affected wetland. WSDOT has worked with the cities of Kirkland and Bothell, as well as King County to coordinate activities to avoid or minimize effects. The mitigation strategy must satisfy the requirements of each jurisdiction to compensate for the respective loss of wetlands within the Kirkland Nickel Project area (Exhibit 5-39).

Despite WSDOT's efforts to avoid wetlands during construction, 0.180 acres of wetlands will be temporarily disturbed, which the contractor will be required to restore. An additional 1.6 acres of wetlands will be permanently filled. The acreage of filled wetlands is distributed among local jurisdictions accordingly:

- Kirkland – 1.229 acres
- Bothell – 0.136 acres
- Unincorporated King County – 0.235 acres

Three sites (Exhibit 5-40) will be used to provide the required wetland mitigation to replace filled wetlands. These sites provide adequate area according to replacement ratios of each jurisdiction to fully mitigate for the filled wetlands.

Exhibit 5-40
Wetland Mitigation Sites



The sites selected for mitigation are:

- Property on the west side of Forbes Lake – WSDOT will use 2.9 acres of acquired property for mitigation. After wetland mitigation has been constructed and monitored, the private property will be deeded to the City of Kirkland.
- Property on the east side of Forbes Lake – WSDOT will use 4.5 acres of City of Kirkland property for mitigation.
- Property south of Thrashers Regional Park – WSDOT will acquire 4.7 acres of private property west of SR 527 (Bothell-Everett Highway) and north of 214th Street SE. After wetland mitigation has been constructed and monitored, the acquired property will be deeded to the City of Bothell.

5.11 Wildlife and Vegetation

Wildlife presence within urban landscapes depends on the availability of suitable habitat. Habitat loss, along with increasing habitat fragmentation, is a primary reason for species decline in urban environments. Greater human access to these areas can also influence the presence and abundance of wildlife in urban environments. Most of the Kirkland Nickel Project area is highly developed for residential, commercial, and industrial activities.

Red-tailed hawks are commonly seen in the project area

How were wildlife and vegetation studied within the project area?

WSDOT reviewed information provided by the Washington Department of Fish and Wildlife (WDFW) and the Washington Department of Natural Resources (WDNR), and conducted field surveys within the project area. WSDOT also contacted resource agencies to validate information and to target field studies.

The study area covered one mile on each side of the freeway (Exhibit 5-41) as well as the adjoining, disturbed mixed-forests[1].

Riparian[2] (streamside) areas were mapped along the major drainages within the project area, including Yarrow Creek, Forbes Creek, and Juanita Creek, to determine existing habitats.

A Biological Assessment (BA) was prepared for the project to comply with the Endangered Species Act. The BA made a finding of "no effect" for bald eagles and a finding of "may affect, not likely to adversely affect" for chinook salmon and bull trout. The US Fish and Wildlife Service (USFWS) and NOAA Fisheries issued letters of concurrence on the BA on October 25, 2004, and October 28, 2004, respectively.

Please refer to the Kirkland Nickel Project Wildlife and Vegetation Discipline Report in Appendix V (on CD) for a complete discussion of the wildlife and vegetation analysis.

What is the Endangered Species Act?

A 1973 federal law, amended in 1978 and 1982, was enacted to protect troubled species from extinction. NOAA Fisheries and the US Fish and Wildlife Service decide whether to list species as threatened or endangered. Federal agencies must avoid jeopardy to and aid in the recovery of listed species. Similar responsibilities apply to non-federal entities.

[1] Forest of hardwood and softwood trees that has been disturbed from development activities.
[2] Land that occurs along or interacts with flowing water.

Exhibit 5-41
Wildlife and Vegetation Study Area

What types of wildlife and vegetation are found in the project area?

Generally, habitats within the I-405 Corridor have been intensely fragmented by urban development, including the freeway. This fragmentation has reduced the value of wildlife habitat by interrupting movement within and through the project area. Wetland and riparian habitats associated with Juanita Creek and Forbes Creek, for example, have been highly fragmented, creating a patchwork of isolated habitat areas, often poorly suited for wildlife.

Wildlife Species

The Kirkland Nickel Project area is dominated by landscaped areas, patches of native vegetation, and maintained grasses. WSDOT manages vegetation within the right of way to discourage use by wildlife that can enter the roadway and cause accidents. With respect to wildlife habitat, these resources typically have low value and are generally highly disturbed (WSDOT, 2002).

Although there is low-value habitat within the project area, the mowed right of way in the I-405 Project Corridor is used extensively as foraging habitat for red-tailed hawks; other wildlife species also use these mowed areas. Given the extensive level of development that has eliminated large expanses of red-tailed hawk habitat, the grass-dominated portions of the right of way likely provide important habitat for the species (WSDOT, 2002).

Vegetation Species

Both landscaped and unlandscaped areas within the Kirkland Nickel Project area are dominated by invasive Himalayan blackberry, sword fern, crab grass, quackgrass, and domestic cherry, among many weed species. The vegetation along the roadway consists of mowed grasses and scattered trees. Approximately 95 acres of disturbed and landscaped vegetation are located within the right of way.

The stream-side vegetation associated with Juanita Creek and Forbes Creek is dominated by sword fern, salmonberry, Himalayan blackberry, and reed canarygrass. Cottonwood, alder, big-leaf maple, fir, and cedar comprise the forested canopy (The Watershed Company, 1998).

Approximately 159 acres of disturbed mixed-forest occur in patches within, or adjacent to, the I-405 proposed Kirkland

Nickel Project area. Most of these patches include successional[3] native forests dominated by a relatively homogeneous mixture of native and non-native species. Western red cedar, western hemlock, Douglas-fir, red alder, and big-leaf maple typically dominate these areas, with an understory of sword fern and scattered vine maple.

Threatened and Endangered Species

WDFW (2004) identified one bald eagle nesting zone within one mile of the project area, the Hunts Point Bald Eagle Territory. This territory has been active since 1992 and contains two nests, both of which are located 1.25 miles or more from the project area. No roost trees are located within one mile of the project area.

How will wildlife and vegetation be affected by the project?

In total, approximately 80 acres of potential habitat is expected to be removed as a result of the project. Of this total, approximately 60 acres of ruderal or landscaped vegetation, 0.28 acres of stream-side habitat, and 20 acres of disturbed mixed-forest will be cleared. Areas with mixed forest, however, will not be removed for temporary use (i.e., construction staging). Areas of disturbed mixed-forest that will be removed for roadway construction will be replaced with plantings of native tree and shrub species (acre for acre) within the project area.

There will be minimal removal of shrubs and trees in stream-side areas associated with Forbes Creek during the proposed culvert replacement beneath I-405 (Exhibit 5-42). Disturbance to stream-side vegetation along Juanita Creek will occur on the west side of I-405 (Exhibit 5-43).

Removal of vegetation will result in some displacement of wildlife, including small mammals and amphibians that exist in these low-quality habitats.

Construction effects on wildlife can be caused by noise associated with equipment movement, excavation, cutting, filling, and grading. Noise during construction activities will

Exhibit 5-42
Vegetation Impacts - Forbes Creek (KL5)

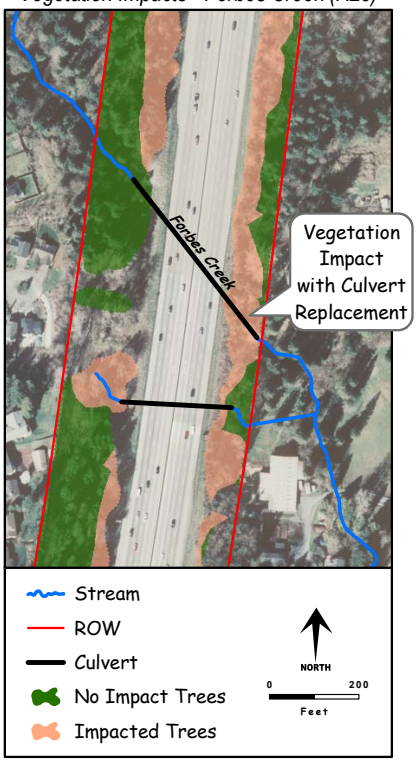
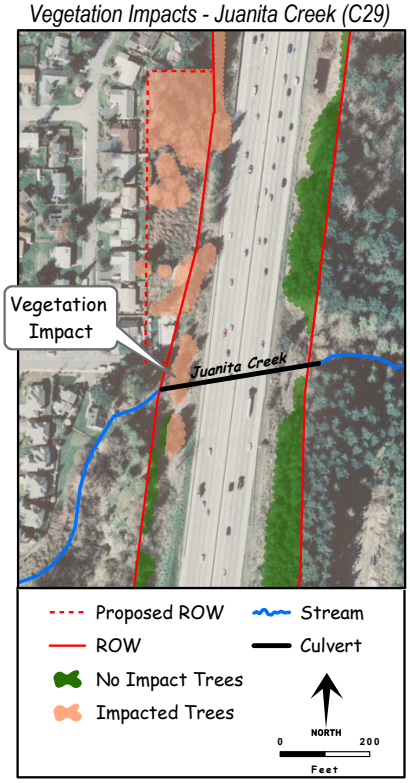


Exhibit 5-43
Vegetation Impacts - Juanita Creek (C29)



[3] The gradual and orderly process of change in an ecosystem brought about by the progressive replacement of one community by another until a stable climax is established.

disturb small rodents, songbirds, and birds of prey. These effects will be minor.

Interstate 405 is a freeway that has been in operation for many years. After construction of the Kirkland Nickel Project, conditions for wildlife will be similar.

What measures are proposed to avoid or minimize effects to wildlife and vegetation during construction?

The mitigation measures established in the *I-405 Corridor EIS* will be used for implementation of the Kirkland Nickel Project.

- The contractor will be required to prepare and implement a revegetation plan that has been approved by WSDOT. In addition, areas with mixed forest will not be removed for temporary use (i.e., construction staging). If the contractor must permanently remove an area of mixed forest for roadway construction, it will be replaced with plantings of native tree and shrub species (acre for acre) within the affected area.
- The contractor will adhere to project conditions identified in the Biological Assessment and agency concurrence letters.

5.12 Fish, Aquatic Habitat, and Threatened and Endangered Fish Species

Finfish, shellfish, and aquatic organisms make use of several streams within the project area during some stage of their life cycle (e.g., spawning, rearing, and migrating). Most streams were modified over time and contain limited habitat for fish. A Biological Assessment was prepared for the project, in compliance with the Endangered Species Act, that made a finding of "may affect, not likely to adversely effect" for chinook salmon and bull trout.

How were aquatic resources evaluated for the project?

WSDOT surveyed habitat conditions on all the streams were surveyed in the Kirkland Nickel Project area (Exhibit 5-44). The surveys focused on fish life and habitat conditions to determine potential effects to aquatic resources that could result from project construction and operation.

What streams are in the project area and what fish species live in the streams?

The affected aquatic environment includes several streams within 300 feet of I-405 that flow beneath or parallel to the roadway. One additional stream segment, at the lower end of Stream KL14, was surveyed in the City of Bothell near a stormwater detention facility (see Exhibit 5-44). Only four of the affected streams were identified by traditional names on maps. They are Yarrow, Juanita, and Forbes creeks, and the Sammamish River. The remaining streams were identified by project fisheries biologists using an alpha-numeric code, e.g., KL2 or C2.

Avoiding or minimizing project impacts to aquatic resources is a vital component of the project. Special consideration is given to these resources because of the biological, environmental, economic, and cultural importance of fish and aquatic species in the Pacific Northwest.

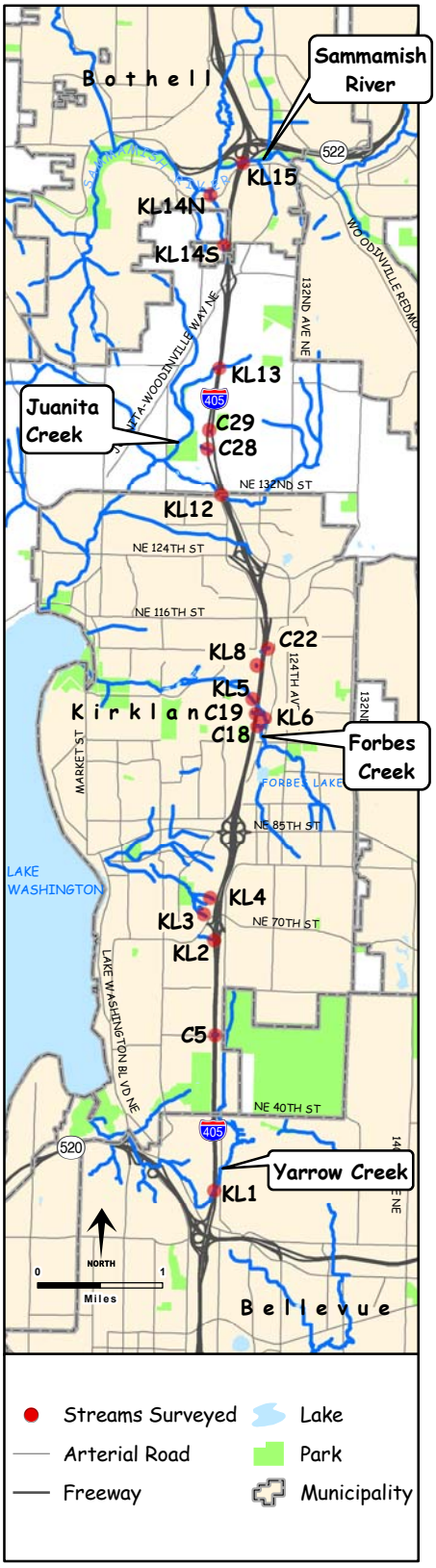
The primary species to consider are the federal Endangered Species Act-listed salmonids. The listed species include fall chinook salmon and bull trout.

Please refer to the Kirkland Nickel Project Fish and Aquatic Habitat Discipline Report and the Supplemental Stream Habitat Survey Report and Impact Assessment in Appendix W (on CD) for a complete discussion of the fish and aquatic resources analyses.

What is spawning?

Spawning is the production and deposition or laying of eggs.

Exhibit 5-44
Streams Surveyed in the Project Area



Other important species within the project area include coho, sockeye, and kokanee salmon; steelhead, rainbow, Dolly Varden, and cutthroat trout; and mountain whitefish (WSDOT, 2002). Information provided by the USFWS indicates that migratory native char, including bull trout and Dolly Varden, occur within the Lake Washington system, but with low frequency (Dan Lantz, USFWS, pers comm., September 29, 2004; unpublished data). Bull trout adults or sub-adults may be present in Lake Washington (also in Lake Union and Lake Sammamish) year round, depending on the availability of prey resources. Currently, within the Cedar-Sammamish water resource inventory area (WRIA 8), there are no reproducing bull trout populations below the winter snow line (WDFW, 1999). There is no known evidence that any of the streams in the vicinity of the Kirkland Nickel Project area currently support bull trout.

There are several non-salmonid species present within the project area. They are either resident, migratory, exotic, warm water, or shellfish species, or some combination of the above. Non-salmonid species that may be present include sculpin, dace, stickleback, lamprey, crayfish, freshwater mussels, chub, northern pikeminnow, suckers, yellow perch, carp, whitefish, and bullheads.

What type of habitat is required for these fish?

Fish habitat was evaluated upstream and downstream of I-405 even though the presence of migrating salmon is extremely limited because of impassable barriers downstream.

Salmon have specific habitat requirements. Different species have different needs for both juveniles and adults. Many of the I-405 streams provide habitat for juveniles but not for adults. Historically, many of these streams were too small for larger adult salmon spawning activities, especially chinook. Of the smaller salmon species, coho, sockeye, and kokanee salmon, and cutthroat trout have the potential to occur in five water bodies within the project area; Yarrow Creek, Forbes Creek, KL6 (a tributary to Forbes Creek) Juanita Creek, and the Sammamish River.

Bull trout require very cold water and high quality stream habitat. For a typical stream, this includes many deep pools with plenty of wood in the stream, and year-round flow.

Habitat conditions were evaluated to determine which resident fish could be present. Resident fish and most of the non-salmonids are different from the migratory salmon species because they live in streams or lakes all their life—that is, they do not migrate to the ocean. Resident fish may include native species as well as introduced species. Like salmon, resident species have unique habitat requirements for food, temperature, shade, or the presence of small gravels.

What are salmonids?

Salmonids are fish that are members of the family Salmonidae, which includes salmon, trout, char, and whitefish.

What is the condition of the fish habitat?

Use by salmon and resident species is limited in many of the streams because of natural and unnatural conditions, including but not limited to poor water quality, lack of spawning substrate, limited open channels, steep gradients, non-passable culverts, and other hydrologic sources such as stormwater.

What are resident fish?

Resident fish are fish that remain in freshwater for their complete life cycle.

Many of the streams exhibit poor habitat and a low potential for salmon or resident species. This is attributed to conditions such as limited food sources, no cover, or no water.

Two major problems occur in these streams: 1) a lack of water, and 2) a lack of open channels (because of pipes and culverts, and water routed through stormwater control basins). Many of the unnamed urban drainages retain less than one half of their historic open-water channels because the remainder is piped underground. For others, during the dry summer months the flow disappears underground.

For bull trout, the streams are too warm; they do not have enough woody debris for cover; and they do not contain the type of gravels needed for bull trout to lay eggs. Because of natural limiting factors, historic use by bull trout of the small streams in the project area probably ranged from extremely limited to no presence at all.

Cutthroat trout are more tolerant of urban stream conditions and appear in some of the streams that flow beneath I-405 within the project area. Cutthroat trout can survive as a year-round freshwater resident or they can migrate to the ocean. Most of the cutthroat in the project streams are considered as year-round residents. Habitat in the project streams is adequate for cutthroat trout to spawn, hatch, and rear to adulthood.

How will the project affect fish, aquatic habitat, and threatened and endangered fish species?

The I-405 project will be built in an urban area where people, buildings, and roads have existed here for many decades, often in conflict with fish and streams. The Kirkland Nickel Project has the opportunity to demonstrate how a highway can be constructed in an urban environment without conflicting with natural resources, such as fish and streams.

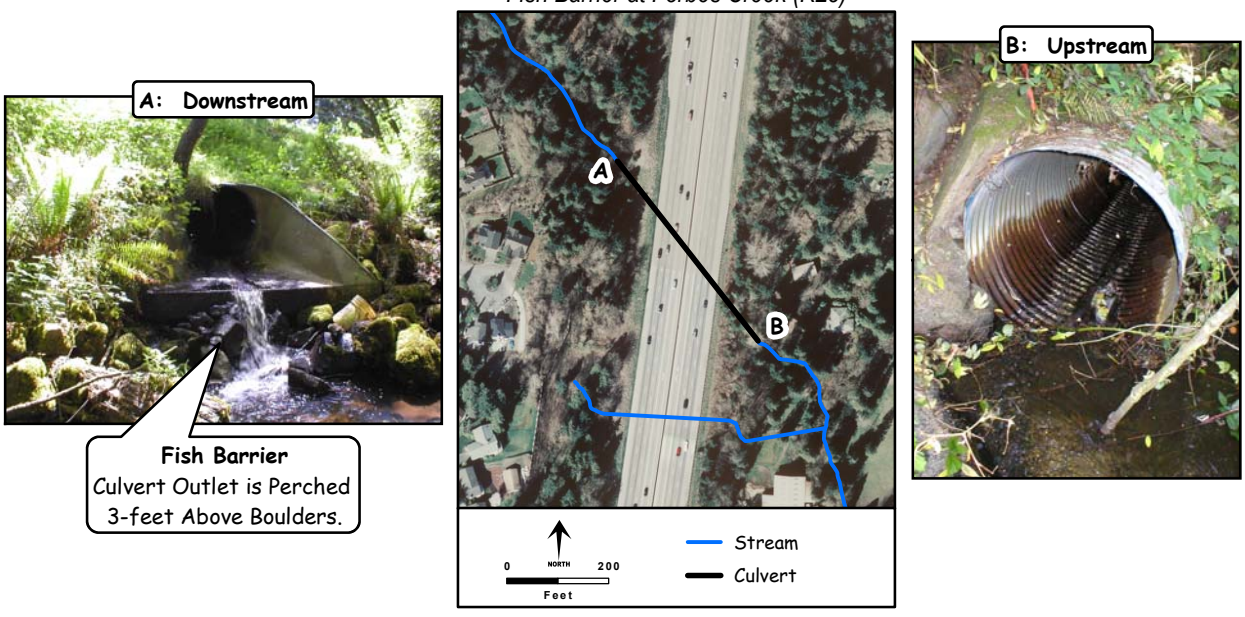
The project will have short-term, long-term, and minor effects to the aquatic resources within the area. WSDOT's goal is to minimize the harmful effects and maximize the long-term, beneficial effects by maintaining existing aquatic resources, and then by improving those resources over time.

Exhibit 5-45 shows the fish barrier at Forbes Creek. A new fish passage structure will be constructed under I-405 to allow upstream fish movement. A long-term benefit will be to improve the quality of water that is entering the streams during storm events. The project will also use the best available science regarding stormwater treatment.

Chinook salmon require very cold water to survive; therefore, WSDOT will manage vegetation to benefit these species by ensuring:

- Vegetation will remain in place near the roadway streams and waterways;

Figure 5-45
Fish Barrier at Forbes Creek (KL5)



- Vegetation will be planted where necessary to provide cover and keep the water cool through more shade; and
- Vegetation will be kept healthy and functioning over time.

Most of the other aquatic resources, including small insects, will also benefit from the colder water and extra vegetation.

In addition to shade, vegetation provides other long-term benefits including:

- Plants reduce erosion, thereby creating less sand and dirt in the streams;
- Dead vegetation helps create big pools in the streams that attract fish;
- Tiny insects live on the wood and leaves of plants and provide food; and
- The stream banks and shoreline remain natural.

How will construction activities affect fish, aquatic habitat, and threatened and endangered fish species?

Construction activities that could affect fish and stream habitat include:

- Filling and grading;
- Removing stream-side vegetation; and
- Temporarily diverting streams and dewatering.

Road widening, culvert replacement and extension, as well as construction of headwalls, retaining walls, and stormwater conveyance systems and associated outfalls to streams, will involve some work in streams, resulting in some loss of instream habitat (e.g., pool and riffle areas). These disturbances may affect spawning, rearing, and migration habitat; however, these impacts are usually short-term because of beneficial revegetation or restoration of other stream functions.

In-water work also results in short-term increases in turbidity and sedimentation, similar to the effects of removing stream-side vegetation. Culvert replacement, culvert extension, or headwalls may require temporary disturbance to the stream bank. There is the potential for bank erosion and downstream

sediment transport during the initial growing period of any stream bank segment subjected to disturbances associated with culvert replacement.

There will be an approximate loss of 2,540 square feet of aquatic habitat as a result of project construction. During construction of the Kirkland Nickel Project, the stream crossing culvert for Forbes Creek (KL5) will be replaced. On average, approximately 10 to 15 linear feet of stream on each side of I-405 may be affected long term (e.g., filled and graded). However, after a fish-friendly culvert is constructed, approximately 7,500 linear feet of stream will become available for fish use between the freeway and Forbes Lake.

Streamside (i.e., riparian) vegetation plays a number of important roles in supporting instream habitat functions. They provide large woody debris, food, stream bank stabilization, water storage, and water quality (Poole and Berman, 2001). Therefore, removal of stream-side vegetation is likely to impact these habitat functions. The extent of vegetation removal determines the type and degree of the effect, especially regarding large woody debris recruitment.

Stream-side vegetation removal can alter soil stability. Loose soils cause erosion, which, in turn, increase sediment deposition in streams or fill the pool habitat (Berman, 1998). In addition, reduction in canopy cover promotes higher temperatures and increases sediment transport from cleared areas (Bolton and Shellberg, 2001).

Vegetation clearing can adversely affect salmonid habitat. Depending on the duration, timing, frequency, and level of turbidity, the associated sedimentation can cause behavioral, sublethal, and lethal effects in juvenile and adult salmonids (Newcombe and Jensen, 1996). However, this loss will be offset by the 7,500 linear feet of stream habitat gained for fish use after construction of the culvert or other fish passage structure at Forbes Creek.

Impacts to stream-side, vegetated areas will result in permanent removal of an estimated 12,340 square feet (0.28 acres) of stream-side habitat.

During in-water construction work at Forbes Creek, the dewatering and temporary stream diversion could harm fish. Harmful activities include fish seining, electrofishing, fish exposure to turbidity (although rare), and small losses of

stream-side functions because of vegetation removal. These fish stressors may induce responses ranging from behavioral to lethal. The contractor will use WSDOT and NOAA Fisheries handling procedures to minimize harmful effects to fish species.

In addition, macro invertebrates and amphibians occupying the dewatered segments of the stream channel will be displaced, thereby temporarily disrupting food sources for fish. However, numerous studies have indicated that benthic invertebrates drift from upstream, rapidly recolonizing the affected area (Barton, 1977; Reed, 1977; Chisolm and Downs, 1978; Waters, 1995). Likewise, aquatic insect production is seldom affected in the long term by minimal habitat displacement and short-term pulses of suspended sediment (Spence et al., 1996). Therefore, any effects on benthic macro invertebrates and aquatic insects are expected to be short-term.

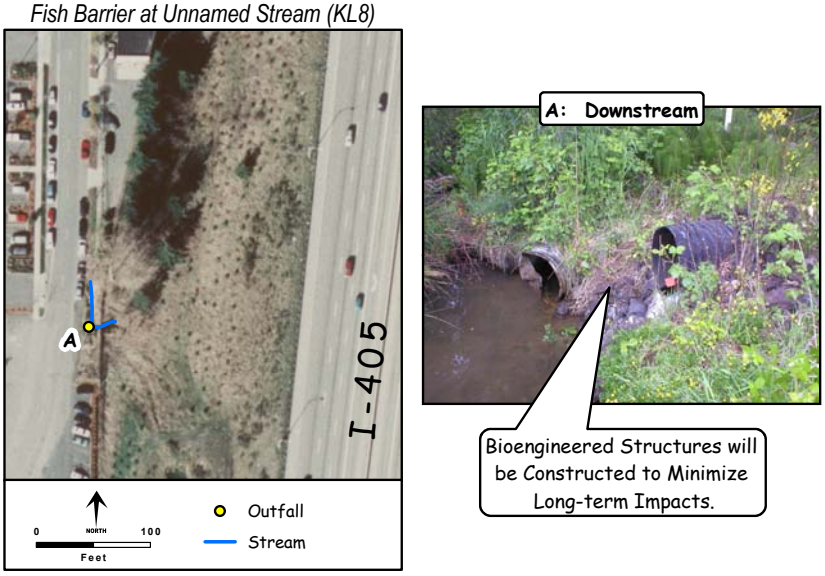
What are the operational effects of the proposed project?

Operational effects are direct effects caused by the existence, use, and maintenance of the project elements, including new or altered stream crossing culverts, over-water structures, stormwater facilities, and impervious surfaces. These features may permanently affect fish and aquatic resources, and their effects could be beneficial or harmful. The primary operational impact to stream habitat will result from new impervious surfaces and subsequent changes in stormwater runoff. New stormwater treatment facilities will be constructed and existing infrastructure will be modified to reduce adverse effects to streams and, in several areas, improve conditions compared to those that exist today (see Chapter 5.9, Water Resources).

Although project elements are designed and sited to avoid or minimize adverse effects on aquatic life, some residual effects are likely during operation of the project.

The Kirkland Nickel Project will extend culverts and construct headwalls to accommodate a wider roadway span in the vicinity of Forbes Creek (KL5), an unnamed stream (KL8) and Juanita Creek (C28, C29), (Exhibits 5-46 and 5-47).

Figure 5-46
Fish Barrier at Unnamed Stream (KL8)



Most of the existing runoff from the highway drains to streams, watercourses, and storm drains with minimal treatment for quantity or quality. The Kirkland Nickel Project will have beneficial effects on fish life in streams and potentially in Lake Washington by improving existing water quality conditions through the removal of sediments, petroleum products and other roadway pollutants. Proper maintenance and improvements to these stormwater structures over time will continue to provide benefits to the aquatic environment.

The project will add impervious surface areas that can result in adverse changes in peak and base streamflow arising from an increase in stormwater runoff. However, a design criterion for the I-405 Kirkland Nickel Project is to limit or reduce peak flows resulting from stormwater facilities discharging to the streams in the area. As a result, the increase in impervious surfaces and the proper operation of stormwater detention facilities will not adversely affect peak and base streamflow in the Kirkland Nickel Project area streams.

Detailed stream-by-stream discussions of the effects of the specific project elements on fish species and aquatic habitat are presented in the Kirkland Nickel Project Fish and Aquatic Resources Discipline Report (Appendix W on CD).

Will the project remove barriers to fish passage?

There are several beneficial actions that will restore and improve fish passage as a result of the project.

One benefit to fish life will occur where a fish-friendly culvert or bridge at Forbes Creek will be constructed to restore fish passage. After this structure is constructed, juvenile salmonids will be able to swim upstream and downstream beneath the freeway. Initially, cutthroat trout and other resident species already upstream of fish barriers will benefit the most. In the future, if barriers are removed, coho and sockeye salmon may benefit. All of these species currently exist in either lower Forbes Creek or throughout the greater Forbes Creek watershed.

Improvements to the stormwater treatment structures also have indirect benefits to fish passage. The new stormwater structures will help maintain normal stream flows, thereby making it easier during a storm event for young fish to swim upstream. This means fish will have better access to habitats.

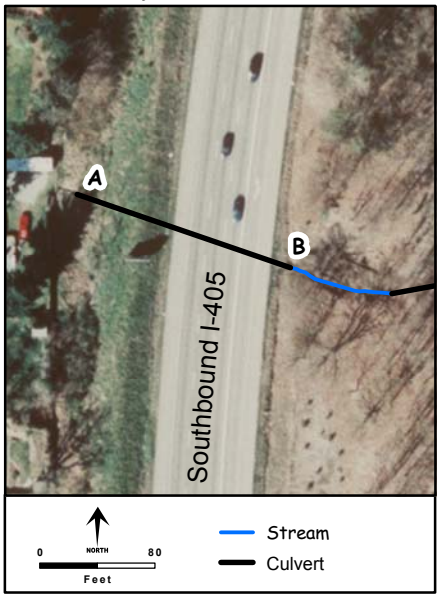
Additionally, revegetation will help retain more water in the streams for longer periods of time. During the critical dry summer months, fish will benefit from improved access to habitats and have a higher likelihood of survival.

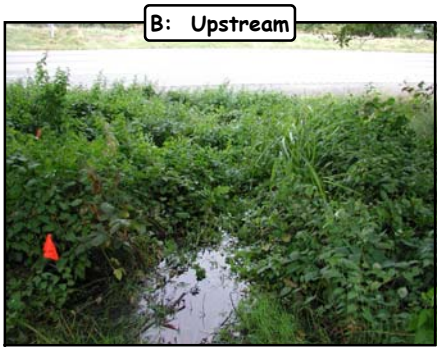
What measures are proposed to avoid or minimize effects to fish and aquatic species during construction?

The following measures will be followed to avoid or minimize effects to fish and aquatic resources during construction:

- The contractor will be required to implement construction BMPs (such as silt fencing or sedimentation ponds) and to avoid disturbing sensitive areas during the development and use of any staging areas, access roads, and turnouts associated with resurfacing activities.
- The contractor will not allow any in-water work to occur except during seasonal work windows established to protect fish.
- The fish-friendly culvert or bridge constructed at Forbes Creek will restore fish passage beneath the freeway. Approximately 7,500 linear feet of stream

Exhibit 5-47
Tributary to Juanita Creek - C29





between the freeway and Forbes Lake will become available for fish use.

- If conditions allow, the contractor will use bio-engineering techniques at new stormwater outfalls near Yarrow Creek, Juanita Creek, Forbes Creek, and the Sammamish River.
- New stormwater discharged to Forbes Creek will be conveyed to Forbes Creek via existing stormwater conveyances so no new outfalls (requiring grading or filling with bank-stabilizing or energy-dissipating riprap) will be constructed in Forbes Creek.
- If the width of the road prism[1] increases to accommodate the wider span of roadway at Forbes Creek and at Stream KL8, headwalls[2] will be constructed at the culvert inlet and outlet to minimize the amount of grading and filling.
- The detention pond on the west side of I-405 will be sited at a sufficient distance south of Forbes Creek so no grading or filling in Forbes Creek or its stream-side zone will be required.
- The combined stormwater treatment wetland/ detention to be constructed near Riverside Drive will be sited at a sufficient distance from both the Sammamish River and the unnamed stream KL14 (at Riverside Drive) so no grading or filling in the streams or the stream-side zones will be required.

What measures are proposed to avoid or minimize effects to fish and aquatic species during operation?

The following measures will be used to avoid or minimize impacts to fish and aquatic resources during operation of the project:

- Stormwater will be controlled so peak and base flows in Yarrow Creek, Forbes Creek, Juanita Creek, and Sammamish River are not adversely affected by treated stormwater discharge from the expanded impervious

[1] The portion of the highway between the ditch lines, curb lines, or toe of fill lines.
[2] A concrete structure at the end of a culvert to protect the embankment slopes, anchor the culvert, and prevent undercutting.

surface areas created by the project. The sheet flow from the roadway surfaces will be captured and held in detention facilities prior to its controlled discharge into streams within the same drainage basin. As a result, peak and base stream flows will not be adversely affected by the increase in impervious surfaces.

- Off-site flow to unnamed stream KL14 will be managed so peak and base flows are not adversely affected by the new stormwater treatment and detention facilities in the vicinity of this stream.
- Ongoing maintenance of stormwater treatment and detention facilities will not include the application of any chemical weed control agents (e.g., herbicides).

Letters of concurrence on the Biological Assessment from the U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries) are included in Appendix D.

5.13 Geology and Soils

Geology is the study of the origin, history, materials, and structure of the earth, along with the forces and processes operating to produce changes within and on the earth. When we consider the geologic features of a project area, we must consider how improvements will interact with the soils, groundwater, and topography, as well as the area's unique physical features. Through focused study, we can make determinations about erosion, suitability of soils for construction, slope stability, and other factors.

Ancient landslide area

How were geology and soils evaluated for the Kirkland Nickel Project?

Scientists and planners studied the geology, soils, topography, physical features, and potential for erosion in the study area. They also considered how subsurface water conditions can affect soil moisture, water supplies, wetlands, and water movement, and how they might affect construction activities. Their data sources included geological maps, aerial photos, and geotechnical reports.

Please refer to the Kirkland Nickel Project Geology, Soils, and Groundwater Discipline Report in Appendix T (on CD) for a complete discussion of geology and soils analysis.

What is the geology of the project area?

The Kirkland Nickel Project area is located along an upland separating the Lake Washington and Lake Sammamish troughs. Most of the present day geologic and topographic conditions are the result of glaciers that covered the land long ago. These conditions affect geologic, soil, and groundwater resources.

The last glaciers left behind a mixture of clay, silt, sand, and gravel. These materials were deposited on top of older glacial materials; the bedrock beneath these deposits is over 1,500 feet below the surface in most areas. As the last glacier receded, a sculpted landscape of long narrow uplands and intervening troughs or valleys remained.

Post glacial deposition has occurred along modern drainages and lakes. Locally, these deposits include accumulations of organic silts, peats, soft clays, and loose sands.

Exhibit 5-48
Landslide and Loose Soil Area

An ancient landslide feature underlies one area at the northern end of the project. The landslide area shows no signs of recent instability except for some areas of highway cuts upslope of the northbound lanes, and a small slide area downslope of the southbound lanes. Evidence of slope instability also exists on the uphill cut side of older roads in the area. Such geologic features set the stage for the soil and groundwater conditions to be addressed during freeway design and construction.

What soils are found in the project area?

The majority of the project area is underlain by dense glacial soils. The roadway alignment crosses several drainages and lowlands underlain by soils deposited after the glaciers receded. Localized areas of these soils include artificial fill, materials deposited by flowing water, lake and peat deposits, and recessional outwash. The only major areas of these recent soils include the soft and loose soils adjacent to Totem Lake at the NE 124th Street interchange, and areas of past landslide activity at the northern end of the alignment at SR 522 (Exhibit 5-48). Areas underlain by these soft and loose recent soils generally require different design and construction considerations than those characterized by dense or stiff glacial soils.

How will geologic resources be affected by the project?

Design and construction of the proposed project will be based on the existing geologic and soil conditions following well-established WSDOT design practices for managing the types of conditions found in the project area. Design elements will be incorporated into the project specifications to address the identified conditions. The project description in Chapter 4 includes several design and construction elements that have been incorporated into the project to address conditions such as slope stability and landslide areas, soft ground areas, and protection of groundwater resources (see also Chapter 5.9, Water Resources).

What measures are proposed to avoid or minimize effects to geology and soils during construction?

Slope Stability and Landslide Areas

- A large landslide feature was identified at the northern end of the project. The design geotechnical investigation will fully examine the landslide area and develop appropriate construction procedures to maintain or enhance slope stability.
- The contractor will be required to submit earthwork and wall placement sequencing plans, construction drainage plans, and a slope monitoring program.
- During construction, areas of observed or suspected groundwater seepage will be drained to reduce the risk of landslide and surface sloughing through the use of gravel drainage blankets, french drains, horizontal drains, and/or placement of a surface rock facing or similar methods.

What is a landslide?

A landslide is the sudden release of a mass of rock and earth down a slope.

Soft Ground Areas

- During the design process, geotechnical engineers will assess potential settlement problems associated with existing utilities or structures. If deemed necessary, structures could be underpinned and utilities relocated or made more flexible. In cases where it is an acceptable solution, the settlement will be allowed, with repairs made after settlement is complete. When appropriate, project engineers will conduct pre-construction surveys and monitor construction settlements.
- Construction vibration, particularly generated by driven pile installation (if allowed by resource agencies), large diameter drilled pier installation, and any required ground improvement, can cause settlement of adjacent areas underlain by loose granular soils. Project engineers will identify these areas during the design phase. The contractor will be required to develop the means and methods to avoid or minimize settlement.

Erosion

- The contractor will be required to prepare and implement a temporary erosion and sedimentation control (TESC) plan.
- Should any BMP or other operation not function as intended, the contractor will take additional action to minimize erosion, maintain water quality, and achieve the intended environmental performance.

What measures are proposed to avoid or minimize effects to geology and soils during operation?

Erosion

- A stormwater pollution prevention plan (SWPPP) for operational activities will document drainage facilities and specify their inspection, operation, and maintenance requirements.

5.14 Hazardous Materials

Hazardous materials can be encountered during the construction and operation of public projects. Examples of common hazardous materials include asbestos, lead-based paint, and total petroleum hydrocarbons[1], also known as TPH. Without proper handling, removal, and containment, these materials can pose dangers to human health and the environment. Identifying known and potential contamination prior to construction is important because it can substantially reduce the possibility of exposure to people and the environment.

Asbestos is a common hazardous material found in older structures

How were hazardous materials and wastes identified within the project area?

The project team reviewed historical land uses, regulatory agency database lists (Environmental Data Resources, Inc. [EDR], 2004), and Washington State Department of Ecology (Ecology) site files. A windshield survey of properties within the project area was also conducted.

Please refer to the Kirkland Nickel Project Wildlife and Vegetation Discipline Report in Appendix X (on CD) for a complete discussion of the hazardous waste analysis.

Are there any potentially contaminated sites in the project area?

Studies indicate that contaminated materials exist on sites located within the proposed right of way or located up-gradient to the proposed right of way. However, within the Kirkland Nickel Project area, no "substantially contaminated" properties were identified.

Seventeen (17) "reasonably predictable" properties, either within the proposed project right of way, or above-gradient to the proposed right of way, were identified for more detailed analysis (Exhibits 5-49 and 5-50). Petroleum hydrocarbons[2] may be encountered in the soil and groundwater at 10 of the 17 identified properties. Six of the 17 properties were listed as

What are "substantially contaminated" properties?

"Substantially contaminated" properties typically refer to sites with large volumes of contaminated materials, a long history of industrial or commercial use, and sites with contaminants that are persistent, difficult, or expensive to manage.

[1] Total petroleum hydrocarbons (TPH) is a term used to describe a large family of several hundred chemical compounds that originally come from crude oil.

[2] Chemical compounds that originate from crude oil.

What are "reasonably predictable" properties?

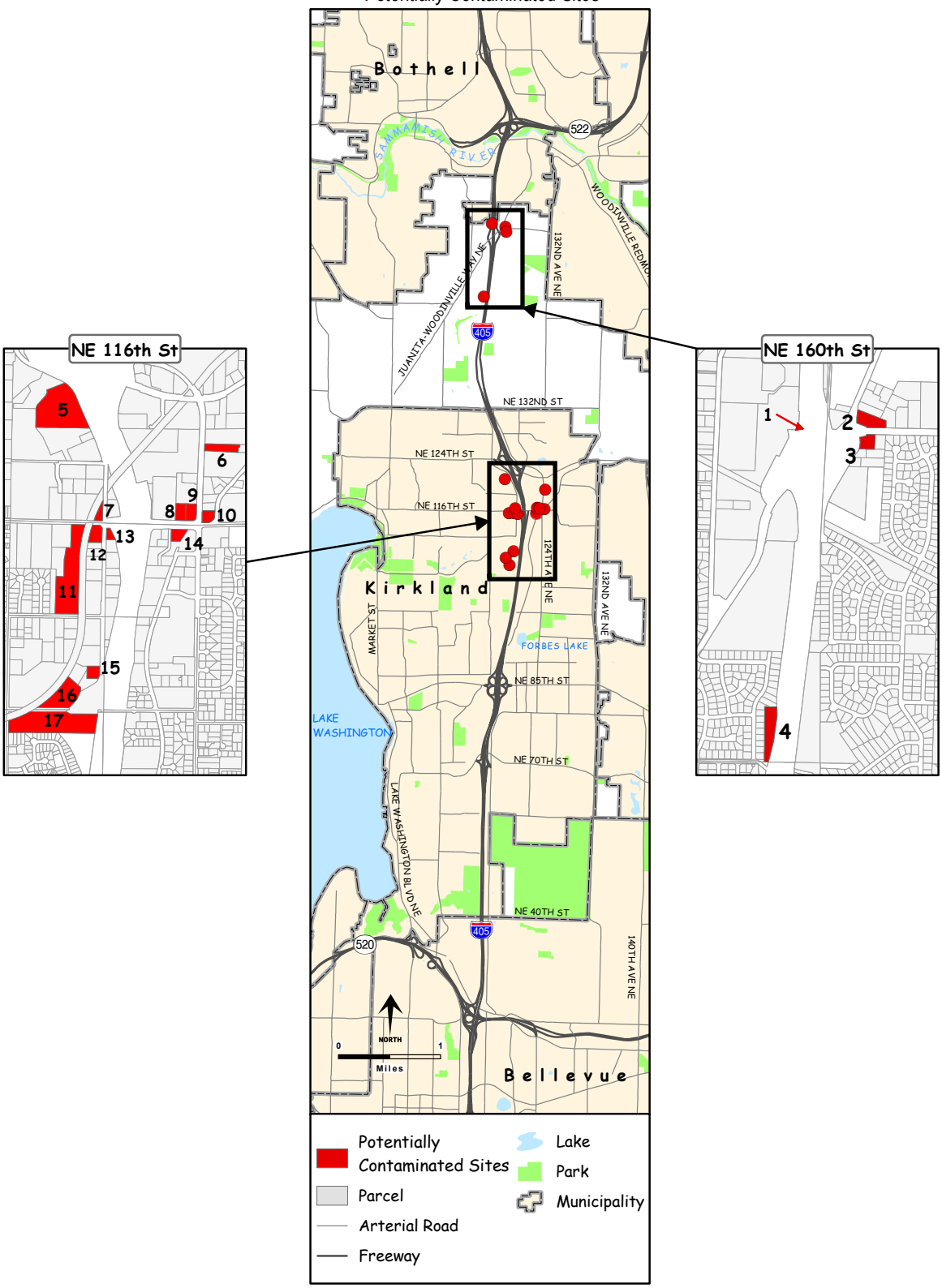
"Reasonably predictable" properties refer to sites with recognized environmental conditions based on existing data, or they can be predicted to have those conditions based on site observations, previous experience, or by using best professional judgment. Common examples of reasonably predictable sites might include a dry cleaning business or a former gas station. These properties are typically small; contaminants are localized and are relatively non-toxic; and abatement or remediation activities are routine.

small-quantity generators (less than 220 pounds of hazardous waste per month). Additionally, six of the 17 properties may contain asbestos-containing materials or lead-based paint (ACM/LBP), based on the age of the structures located on the properties.

Exhibit 5-49: Reasonably Predictable Properties

Map ID No.	Property
1	I-405 and NE 160th Street Exit SB
2	Texaco #632321469/ Star Mart #120531/Shell Oil Products
3	Chevron USA Products 93299
4	Residence
5	Fred Meyer Totem Lake
6	Buchan Brothers Investment Property
7	Quality Transmission, Inc.
8	Eschem Automotive Inc./ Bel Kirk Body Shop Inc. DBA Clarks Wheel
9	Ultra 1-Hr Cleaners
10	ARCO Facility/CYJ Inc.
11	Stericycle of Washington, Inc. Transfer Facility
12	John Coleman
13	Eastside Petroleum Co., Inc.
14	Exxon #7 3640/Tosco 0314730113/BP Service Station 03147/Conoco Phillips Co 2603147
15	Cascade Structures, Inc.
16	Weathervane Windows/Vander Hoek Corporation
17	Pacific Systems/ Tel Tone

Exhibit 5-50
Potentially Contaminated Sites



Spills are infrequent along I-405 in the project area. Between 2002 and 2004, there were only 19 spills involving a total of 161 gallons. These spills consisted of motor/hydraulic oil (21 gallons), diesel (70 gallons), class A firefighting foam (10 gallons), paint (150 gallons), and gasoline (10 gallons).

Will the project affect any hazardous materials sites?

At least two hazardous materials sites have been identified within the project right of way.

During construction, the contractor will comply with all applicable environmental rules and regulations as described in the Kirkland Nickel project description (see Chapter 4). Despite measures to manage risks associated with hazardous materials, spills can occur or unknown contaminants can be encountered. These materials can result in short-term contamination to the environment before avoidance actions can be taken.

What measures are proposed to avoid or minimize effects from hazardous materials during construction?

Known or Suspected Contamination within the Project Right of Way

- The contractor will prepare a spill prevention control and countermeasure (SPCC) plan that provides specific guidance for managing contaminated media that may be encountered within the right of way.
- WSDOT may be responsible for the remediation and monitoring of contaminated properties that will be acquired for this project. In such cases, WSDOT will further evaluate the identified properties to assess their condition before acquisition or construction occurs.
- Prior to construction, the contractor will have a thorough asbestos containing materials/lead-based paint (ACM/LBP) building survey completed by a certified building inspector on all property structures that will be acquired and/or demolished.
- If WSDOT acquires a portion or all of a property (building, structure) suspected of containing ACM/LBP, the contractor will properly abate and dispose of any existing ACM and LBP contamination prior to construction activities. Depending on the

concentration of lead in the demolition debris, some debris may need to be disposed of as dangerous waste, which will require Ecology to be notified and that appropriate regulations are followed.

- If the contractor encounters an underground storage tank (UST) within the right of way, WSDOT will assume cleanup liability for the appropriate decommissioning and removal of the UST. If this occurs, WSDOT and the contractor will follow all applicable rules and regulations associated with UST removal activities.
- Construction waste material, such as concrete or other harmful materials' disposal/treatment, will take place at approved sites.
- WSDOT may acquire the responsibility for cleanup of any soil or groundwater contamination encountered during construction within WSDOT right of way. Contamination will be evaluated relative to Model Toxics Control Act (MTCA) cleanup levels.
- The contractor will be required to meet all regulatory conditions imposed at contaminated properties (e.g., Consent Decree) associated with construction. These conditions could include ensuring that the surrounding properties and population are not exposed to the contaminants on the site; i.e., the contractor will ensure that the site is properly contained after construction is completed so that contaminants do not migrate offsite and so that the health and safety of all on-site personnel are protected during work at the site.
- WSDOT will consider entering into a pre-purchaser's agreement for the purposes of indemnifying WSDOT against acquiring the responsibility for any long-term cleanup and monitoring costs.

Known or Suspected Contamination Outside of the Project Right of Way

- Contaminated groundwater originating from properties located up-gradient of the right of way could migrate to the project area. WSDOT generally will not incur liability for groundwater contamination that has migrated into the project footprint as long as

the agency does not acquire the source of the contamination. However, WSDOT will manage the contaminated media in accordance with all applicable rules and regulations.

Unknown Contamination

- If WSDOT acquires a property that has unknown contamination, the agency could incur liability for any contamination discovered after acquisition, as well as liability for the removal of any stored materials remaining onsite at the time of the acquisition. WSDOT could be responsible for cleanup or disposal of these unknown substances, for example, USTs and contaminated media (including ACM and LBP). If unknown contamination is discovered during construction, the contractor will follow the SPCC plan as well as all appropriate regulations.

Worker and Public Health and Safety

The contractor will comply with the following regulations and agreements:

- State Dangerous Waste Regulations (Chapter 173-303 WAC);
- Safety Standards for Construction Work (Chapter 296-155 WAC);
- National Emission Standards for Hazardous Air Pollutants (NESHAP) (Code of Federal Regulations, Title 40, Volume 5, Parts 61 to 71);
- General Occupational Health Standards (Chapter 296-62 WAC); and
- Implementing Agreement between Ecology and WSDOT Concerning Hazardous Waste Management (April 1993).

Hazardous Materials Spills During Construction

- The contractor will prepare and implement a SPCC plan to minimize or avoid effects on soil, surface water, and groundwater as described in Chapter 5.9, Water Resources.